JOURNAL

OF

THE FRANKLIN INSTITUTE,

OF THE

State of Pennsylvania,

AND

AMERICAN REPERTORY.

DECEMBER, 1846.

CIVIL ENGINEERING.

The Gauge Commission.

Analysis of Evidence given before the Royal Commissioners appointed to investigate the subject of the diversity of Railway Gauges.

(Continued from page 305.)

Mr. James Edward M'Connell:—Is, and has been for upwards of four years, superintendent of the locomotive department on the Birmingham and Gloucester railway, now part of the Bristol and Birmingham. If as large an amount can be got of evaporating space, compared with the weight of the engine, on the narrow as on the broad, they would be equal in that respect.

Dimensions of Mr. M'Connell's Locomotive Engine at Bromsgrove.

The dimensions of the Great Britain locomotive engine, constructed at Bromsgrove station, and now employed to work the heavy goods trains upon the Lickey Incline on the Bristol and Birmingham railway, are as follow, viz:—

	Ft.	In.		Ft.	In.
Diameter of cylinders,	0	18	Diameter of pump rams,	0	2½
Length of stroke,	0	26	Breadth of shell of fire-box,	4	4½
Diameter of each of the six wheels	0	45	Length of ditto, outside,	3	11
Distance from centre to centre of front wheels,	6	9¾	Height from bottom to top,	6	3
			Height of lower edge of cylinder,	2	0

Distance from centre to centre of hind wheels,	6	11	Length of chimney,	6	9
Length of boiler,	12	0	Circumference of ditto,	5	6
Length of tank over boiler,	11	9	Total weight of engine,	30 tons	
Breadth of ditto.	3	7	Weight on front wheels,	9 tons	
Depth of ditto.	2	7	Weight on centre wheels,	12 tons	
Distance from centre to centre of cylinders,	6	2	Weight on hind wheels,	9 tons	
			Height of smoke-box,	6	1½
			Width of ditto,	4	10
Length of tubes, No. 134,	12	6	Diameter of boiler cylinder vertically,	3	10
Diameter of ditto.	0	2			
Diameter of piston rods,	0	3	Ditto ditto horizontally,	3	9

The Lickey incline is one in thirty-seven, which is a very steep gradient, and has always been worked by a locomotive engine. For the last four years, engines were of so light a construction that they had not sufficient adhesion on the driving wheels; in order to test the relative economy of a heavy and light engine in working this steep gradient, witness made an engine which has been at work now the last two months, with a cylinder 18 inches diameter, stroke 26 inches, and the driving wheels 46 inches diameter, six wheels, all coupled. The engine carries its water in a tank on the top of a boiler, so as to give it the advantage of all the weight possible to increase the adhesion of the wheels, and it weighs, in working order, somewhere about 30 tons. There is a great variety in the weight of the engines on the two lines, from 10½ up to 30 tons; the average weight of the 30-inch cylinder passenger-engines is about 12¼ tons, with 5 feet driving wheels. Four have 5ft. 6in. wheels, for mail and express trains, and weigh about 13 tons. The average speed of express trains about 30 miles an hour, with 15 tons load. The luggage van is about half a ton lighter than the passenger carriages, and is placed next the engine. For the last three years, the van has been placed there, on the recommendation of the Board of Trade, for public safety, and if they had two, or any empty carriages, they would be placed there to prevent risk to passengers. Is aware that the lighter the carriage with high velocity, the greater is the tendency to run off the rails, but thinks when the luggage-van is loaded, the weight is sufficient; and the empty carriage is about as heavy as the loaded van; should not place an empty van there; would place two loaded vans if he had them. The relative speed of heavy goods trains on the two lines averages on the broad 8¾ miles and 13 on the narrow. The broad gauge wagons do not load more heavily than the narrow; that is the result of the regular working of the traffic. 135 wagons upon the narrow gauge carried 138 tons net; and that on the broad gauge, 135 wagons carried 134 tons net. On one occasion, the gross load upon the broad gauge conveyed by Mr. Slaughter's engine was 235 tons 2 cwt.; the tare was 137 tons 12 cwt.; the net was 97 tons 10 cwt. On the narrow gauge the gross load was 254 tons 9 cwt., the tare 101 tons 17 cwt., and the net 152 tons 12 cwt. The wagons were taken and loaded expressly, that there should be as little dead weight as there possibly could; and this is a further proof of the comparative net and tare upon the two gauges. There were 36 wagons upon the narrow gauge, and 25 wagons upon the broad gauge. On the latter the gross load was 235; on the former 254. With 35 tons 15 cwt. less tare,

there was on the narrow gauge 55 tons 2 cwt. more net. Went up two inclines of 1 in 100 at a speed of 8 miles an hour. On other portions of the line, that is, on level portions of the line, and slight inclinations, our maximum speed was 25 miles an hour. Size of the engine on the broad gauge: cylinder 16 inches diameter, stroke 21 inches, wheel 54 inches, gross weight of engine and tender 23 tons. Size of engine on the narrow gauge: cylinder 15 inches diameter, stroke 24 inches, wheel 54 inches, weight of engine and tender 27 tons. All six wheels were coupled in both cases, so as to get the utmost adhesion to the engine. The Birmingham and Gloucester is laid in longitudinal bearings, thinks the Bristol and Gloucester is also laid with them. An increase of the boilers would increase the weight of the machine, and thinks that, at a high velocity, a very heavy engine would act very injuriously on the rails; so far as it is safe for the rails, the increase of the weight and power of the engines to produce speed, can be got on the narrow as well as on the broad gauge. The consumption of coke, consequent upon the generation of more steam, would be greater, but thinks it is cheaper to work with one large powerful engine than with two small ones: has an engine on the narrow gauge capable of taking 600 to 700 tons, and his engine will take 1000 tons on lines of easy gradients, at 10 or 12 miles an hour. Thinks the injury to the rails and permanent way would be very much increased by increased weight and speed. Believes the injury to the permanent way on both gauges is more caused by high velocity than increase of weight. Has observed that the shocks received from the fast trains appear to affect the rails more than the slow, and the contractors for the repairs do not like fast trains so well as heavy ones at slow speed.

Has not seen the fractures of axles on the broad gauge; has seen them on the narrow. A very extraordinary change takes place in axles from the constant blows the wheels receive; it amounts to what is called cold swedging on the anvil, and renders them more brittle, which must exist to the same extent on the broad gauge; on the narrow, axles have broken that had worked three or four years, and though at first they might be fibrous in their texture, yet on fracture they appeared as if broken up into small crystals; considers the breakage of axles must arise generally from this, and the greatest care is required to get them of the best manufacture, and of the toughest and strongest iron. Prefers those of the patent axle company, near Wednesbury, with radial bars all welded together, and finds them, from experience, superior to the Low Moor. The elasticity of the long bearing of the axle would affect the wheel, throw it out of the perpendicular, tend to injure the railway, and force it out of gauge; on curves, an objection arises again to the broad gauge, as one wheel has to travel over greater surface than the other, there is either a straining of the wheel, or a twisting of the axle; the axle will be strained and deteriorated in this manner more on the broad gauge than on the narrow.

100 miles is a fair day's work for an engine, but he sees no objection to doing more; thinks that by seeing that the engines are in good

order, and changing them once a fortnight, there is economy in working as much as 150 miles; the steam being raised in fewer engines would save fuel. Is aware that the London and Birmingham Company change their engines at Wolverton; they make a trip each way, being 120 miles a-day, without putting out the fire. If the gauge were uniform at Gloucester, one-third of the present staff of porters could do the goods trade; at present they are kept for lifting goods from one wagon, and repacking them in another, which requires five to six hours from their arrival. The guards' returns show, during the month of August, an average detention of 16 minutes for passenger trains. The detention to goods trains by transhipment from one gauge to another, cannot be estimated at less than from 4½ to 5 hours. Thinks the alteration of gauge matter of necessity, and that the cost would form a very small practical part of the ultimate profit. Supposing the cost to be £5,000 a mile, has no doubt the increased profit would more than cover the interest of the outlay, but thinks £5000 is very much too high a sum for the alteration, for this reason—with respect to the wagon-stock, it would take for instance for 50 miles of railway a certain number of wagons, but for 100 miles of railway it does not take a double number of wagons, because if the wagons work through, a small addition, comparatively speaking, would work the 100 miles beyond what is required for the 50. And so with respect to all the carrying stock. Having the carrying stock for the Birmingham and Gloucester portion, it would require a very small addition for working the other portion of the line, comparatively speaking. To lay down the broad gauge to Birmingham would amount to a complete demolition of the present works; the bridges and tunnels are too narrow, and the stations must be removed. Imagines the expense would be very great, almost a re-making of the line. The largest goods train he ever knew to arrive from the north at Gloucester was 320 or 330 tons gross weight, but thinks only a small quantity was transhipped to the broad gauge, as it consisted chiefly of salt shipped at Gloucester. In many cases, a day is occupied in transhipping. Recollects 40 or 50 loaded goods wagons waiting at Gloucester a fortnight for broad gauge wagons to come up, and that may occur either way. No mechanical arrangement at Gloucester for transferring goods, but manual labor and cranes. At first, shifting on low trucks was proposed, but on inquiry, they did not go to this expense. Goods wagons placed on additional trucks would not pass under the narrow gauge bridges, but they could on the broad. The weight of the additional trucks on the broad gauge would be about 3 tons 5 cwt. Although mechanical arrangements may work well experimentally, believes they will be found in practice totally unfit for every day traffic. The strength of the railway carriage and body is increased by their being united, and being exposed to rough usage, a separation would be a constant cause of damage to the carriage and the goods in it. Thinks that detaching the bodies of passenger carriages from the wheels and frames would be highly objectionable. High velocities would not increase the expense on the narrow as much as on the broad, the lighter machine on the narrow

having less tendency to damage the rails. The permanent way on both lines is kept up by contract, and the expense on the Birmingham and Gloucester is about £100 per mile. The rails on the latter were originally too light, and the timbers and cross sleepers of the embankments not sufficiently seasoned, nor put into the Kyanizing process, so that the expense of repair has thus been increased. A line well made would be kept up at a very low expense. Believes that 75 lb. rails are now adopted on all lines, and they are to be substituted for those on the Birmingham and Gloucester.

Description of the improvements on the narrow gauge engines with six wheels.—The general features of both are as follows: Mr. Robert Stephenson has always advocated the six-wheel engine, and has made it; he has improved it very much; he has simplified the arrangement and construction of the engine; he has adapted the outside cylinder to his passenger engines, with a framing riveted to the boiler plates; and he works his slide valves in a vertical direction. He has very much increased the length of the boiler. The average length, before it was varied by Mr. Stephenson, was from 8 to 10 feet, and now Mr Stephenson has adopted the 12 feet tube and upwards, thereby safely calculating that a very great economy is effected in the consumption of fuel, that is, that a less proportion of heat is allowed to escape unprofitably up the chimney. This engine is found to answer in practice exceedingly well, inasmuch as it gives a greater length of engine on the rails, and increases very much its steadiness at a high speed. He has also a patent for placing the whole six wheels between the fire-box and the smoke-box, whereby he is enabled to distribute the weight more equally on the wheels. In working the engine he also uses what is termed the expansive motion, the link motion. It enables the driver of the engine to regulate the supply of steam to the cylinder in proportion to the load. There are various plans of doing so. There is a plan proposed and patented by a Mr. Bodmer of Manchester and Mr. Myers of Malhausen on the Continent for doing the same thing, all tending to the saving of steam, and providing the quantity of steam requisite to overcome the load. The size of the engine is increased. At one time it was considered that from 12 to 13 inch cylinders was a good average size for working railways. Now we find from experience that economy of working is very much assisted by taking the train by one heavy engine instead of two light ones: that is to say, you save the wages of two men; and the expense of repairs is very much reduced, and materials, for instance, oil and tallow, &c., and the consumption of coke in the one engine is not at all equal to the consumption of the two, which would only do the same amount of work. The practice has become general on narrow gauge railways to adopt 15 inch cylinders instead of 12 inch, and even higher than that. There are at present engines being made at Messrs. Sharp's manufactory at Manchester with 18 inch cylinders of nearly the same size as the one at work at Bromsgrove, but with 24 inch stroke, 4 feet 6 inches driving wheels. They are intended for the Sheffield and Manchester Railway and the Manchester and Birmingham, and

it is calculated they will be of very great service with heavy goods trains, and enable them to carry at a very low cost indeed. Those engines will be equal to take 800 tons, and travel with ease when they are at work; providing that, so far as the power of an engine is concerned, the power of getting machinery on the narrow gauge is sufficient to take any load; it will be quite equal to produce it, at least as far as it can properly be adopted without increasing the weight of the machine to the injury of the permanent way. Our power is increased more than it would be warrantable to increase the weight of the machine, of which the engine at work at Bromsgrove is an instance; for although it is 30 tons in weight, the whole six wheels can be made to spin round and slip with the six wheels coupled. That settles the point completely that we can get sufficient power on the narrow gauge, without at all injuring the construction of the engine, or rendering it objectionable. With respect to those engines that are in construction by Messrs. Sharp at present with the 18 inch cylinder, it is a most remarkable thing that the cylinders are not placed outside the wheels, but inside, so that there is room for two 18 inch cylinders in the narrow gauge to be constructed inside the wheels, working with the crank shaft. That does not much affect the centre of gravity; the cylinder is kept low; the valves are underneath in this case. The principal objection is the crank shaft, to get room for the boiler; but on the drawings and on the elevation of the engine, the centre of gravity does not seem at all to be too high. Those engines have four eccentrics, and are to be worked with the link motion. Thinks a speed of from 12 to 20 miles an hour with a goods train, as great as would be safe with this weight of engine on either gauge. These engines not used for passenger trains, the wheels being only 4 feet 6 inches in diameter, and wanting adhesion as well as power.

Description of the improvements on narrow gauge engines of the second kind, namely, those with four wheels.—Mr. Bury has always been a maker and supporter of the four-wheel locomotive engine. They are in use on the London and Birmingham Railway and several other railways. They also have been much improved; the boilers have been lengthened to about 11 feet; they have been increased in size with 15 inch cylinders and 2 feet stroke. The interval between the fore and hind axle is somewhere about 6 to 7 feet; in those of Mr. Stephenson's the distance is rather less than 12 feet; they are all in the space between the fire-box and the smoke-box. A plan is adopted on the London and Birmingham, of attaching the engine to the tender by a draw spring, rendering it an 8-wheeled machine. Believes, with the inside bearings adopted by Mr. Bury, that the engine would go on with the axle broken. Has seen them going 12 to 14 miles an hour with the axle cut through. Has known the axle broken, and not discovered till the train was at the station. The breaking of the axle takes place close to the journal, and sometimes at the corner of the crank, the iron being cross there, and not so strong. Prefers the strait axle with outside cylinders for safety. The chief objection to the crank axle is liability to give way.

(To be continued.)

Remarks on Iron Rails, for Railways. *By* R. RITCHIE, C. E.

Mr. Barlow came to the conclusion, that the strength of a bar should be double that of the mean strain or load. In his first report, he thought from 10 to 20 per cent. would be sufficient; that is, for a 12-ton engine, as the weight is at present distributed, a strength of 7 tons would be ample provision; and with greater accuracy of construction, a less strength would suffice; or rather, allowing the same strength, an engine of 14 or 16 tons might be passed over with greater confidence. Thus, for 12 tons' weight, with a velocity of about 35 miles per hour, 7 tons would allow a surplus strength of 16 per cent. beyond double the mean strain. The deductions from his experiments led him to recommend that the section of an iron rail for a 5-feet bearing, with strength 7 tons, should not exceed 5 inches in depth; that the head ought not to be less than 2·25 lb. per yard, and be 1 inch in depth; that the whole weight at the sections should be 67·4 lb. per yard; the thickness of the middle rib, ·85 inch; depth of bottom web, 1·66 inch; and breadth of ditto, 1⅛ inch; that the deflection of such a rail, with 3 tons, would be ·064 inch.

For bearings of less width, he did not reduce the weight or size of the head, but kept it at the same section, decreasing the whole weight and depth of the rail: thus for a strength 7 tons, with a 3-feet bearing, the whole weight was 51·4 lb., whole depth 4½ inches, depth of bottom web 1 inch, breadth 1·25 inch, thickness of middle rib ·6 inch, deflection with 3 tons was ·024 inch.

Notwithstanding that Professor Barlow expressed a strong opinion in favor of the single-flanched rail over the double,—that he could see no advantage the latter possessed to compensate for its actual and obvious defects, that he considered it inferior in strength and convenience in fixing, and that the advantage it was supposed to possess, namely, that it might be turned when the upper table was worn down, was impracticable, and that he saw no advantage in the broad bearing,—still the double-headed rail, in practice, has almost entirely superseded the single one: whether the adoption of the double one arises from affording greater convenience to the rail layer, and facilities for keying it, and the advantage of having the power of reversing it, and selecting the best side, or from the manifest advantage of a broad bearing to the rail,—this form is now generally preferred.

The Liverpool and Manchester Railway Company has of recent years adopted a double parallel rail of a peculiar section; not admitting, however, of the power of turning it. The object to be attained in adopting this shape, is stated to be, that by having the part of the rail upon which the flanch of the wheel acts, of the same outline as the flanch itself, greater strength is given to the rail, while the other edge of the rail is lightened. These rails have been laid down at 60 and 75 lb. per yard.

The more common and useful form of a double parallel rail, is when the segmental outline is the same at top and bottom; for although it cannot be denied that the weight of the bottom flanch does not add

proportionably to the strength of the rail, nor even that the power of turning it is at all times practicable,—yet there cannot be any doubt that this form, for railways constructed on separate blocks and sleepers, presents many advantages; and besides, as the cost is nearly the same for a rail with the top and bottom flanches alike, with that where the bottom web is somewhat lighter, no hesitation can exist in preferring the former, however much theoretical deductions may mystify the subject.

A double parallel rail, weighing 75 lb. per yard, has been laid down on the London and Birmingham, Eastern Counties, South Eastern, Edinburgh and Glasgow, and many other railways. The whole depth is 5 inches, the top and base are the same sections, 2·5 inches, the thickness of middle rib is about ¾ of an inch or less.

A double parallel rail has been used upon the Grand Junction and other railways, weighing 62 lb. per yard; whole depth, 4·5 inches.

A double parallel rail, about 65 lb. per yard, of which the whole depth is about 4½ inches, has been laid down on some parts of the London and Birmingham railway.

A 75 lb. rail was laid down on the Edinburgh and Glasgow railway. The inner side of the chair being curved, admits of ample space for the key to wedge the rail firmly.

The rail and chair which are now laying down on the North British railway are about 70 lb. per yard, in 12 and 16 feet lengths. The top and base are different sections, probably adopted with a view of saving in the weight, but presenting no corresponding advantages. The keys or wedges are made of oak, and are small in size.

It seems generally agreed, that the bearing surface for the wheels to run upon, without being too heavy, or so narrow as in an additional degree to wear the wheels, should be about 2½ inches; and hence this size of a head is generally adopted for public railways. Although, both theoretically and practically, it has been assumed, by Messrs. N. Wood, Barlow, and E. Wood, that the strongest form of rail is that of which, with sufficient depth for rigidity, the base does not contain too great a quantity of material,—and though Mr. Barlow has given a formula for calculating the section of greatest strength—still the great object that the public are interested in, is the best form of rail for safety; and of which, while it has sufficient strength to bear upon it heavy loads in motion, the bearers should not be too far apart, to increase in the least degree the amount of either vertical or lateral deflection. When a rail possesses these advantages, its exact shape on mathematical principles is of less importance than its convenience of being easily fixed, and quickly shifted. Hence, while the single parallel rail is decreasing in practical application, the double one, from its convenience, is progressively extending. A knowledge of these facts is essentially necessary for every one engaged or connected with railways, whether he be a director or shareholder, whether an engineer or manager. With all the knowledge yet acquired, there is ample evidence of the uncertainty which still hangs around the subject; and the great expense it has already cost some of the older companies in making alterations, shows that experience to them has been

dearly bought. For example, it has been shown that the Liverpool and Manchester Railway Company has had several times to alter the rails on that line; to increase the weight from 35 lb., the weight of the original rail, to 50 lb., 65 lb., and 75 lb. per yard, successively; while the London and Birmingham Railway Company, notwithstanding the advantages derived from Mr. Barlow's able report, was obliged to reduce the width of the bearings or supports from 5 feet to 3 feet 9 inches, and to increase the weight of the rails from 64 lb. to 75 lb. On other railways equally expensive alterations have been made. There is every probability, therefore, that, so long as that plan of railway construction continues, whatever may be the first cost to railway companies, a still greater weight must be given to the rails, and a still farther reduction of the width of the bearers must take place, in order to adapt the stability to increased rapidity of traction.

It may be observed that the rails have gradually been increased in strength since steam power was introduced; the bars are usually made in 12, 15, and 16 feet lengths, with square or butt ends, and are laid end to end, the earlier complex contrivances to secure the joints being all dispensed with, and the half-lap joints now rarely used. About $\frac{1}{16}$ of an inch, at least, should be left between the ends for expansion; for it has been ascertained that a bar of 15 feet in length will expand about $\frac{1}{11}$ of an inch at 75° F. Some have, indeed, proposed to place a small piece of wood between the ends of rails, as the different expanding properties of wood and iron would fill the space, the wood expanding as the iron contracts: but such a plan is liable to objection from the wood being likely to be shaken out, and the space being left vacant. There is no part of railway construction that requires more accuracy of fitting than the joints: the squareness of the ends, and the space allowed for expansion, cannot be too carefully regulated. Instead of that, how often are seen spaces at the joints of different widths, and the ends of the bars in juxtaposition, without parallelism and uniformity of level; thus increasing the amount of friction, adding to the jolting and rocking motion, and to the risk of the wheels of carriages being thrown off the rails."

Civ. Eng. & Arc. Jour.

On a new method of Boring for Artesian Springs, by M. Fauvelle, *of Perpignan, in France. Read by* Mr. Vignolles, *being furnished by* M. Arago, *for the purpose of being communicated to the Association, M. Arago himself being prevented by illness from attending.*

The paper was an abridged translation of M. Fauvelle's own account, in which he says:—"In 1833, I was present at the boring of an artesian well at Rivesaltes; the water was found, and spouted up abundantly. They proceeded to the tubing, and for that purpose enlarged the bore-hole from the top downwards. I was struck by observing that it was no longer necessary to draw the boring tools to get

rid of the material, and that the water, rising from the bottom brought up with it, in a state of solution, all the soil which the enlarging tools detached from the sides. I immediately observed to my friend, M. Bassal, who was with me—This is a remarkable fact and one very easy to imitate; if, through a hollow boring rod, water be sent down into the bore-hole as it is sunk, the water, in coming up again, must bring with it all the drilled particles. On this principle I started to establish a new method of boring. The apparatus is composed of a hollow boring rod, formed of wrought iron tubes screwed end to end: the lower end of the hollow rod is armed with a perforating tool, suited to the character of the strata which have to be encountered. The diameter of the tool is larger than the diameter of the tubular rod, in order to form around it an annular space through which the water and the excavated material may rise up. The upper end of the hollow rod is connected with a force-pump by jointed or flexible tubes, which will follow the descending movement of the boring tube for an extent of some yards. This boring tube may be either worked by a rotary movement with a turning handle or by percussion with a jumper. The frame and tackle for lifting, lowering, and sustaining the boring tube, offer nothing particular. When the boring tube is to be worked the pump must be first put in motion. Through the interior of the tube a column of water is sent down to the bottom of the bore-holes, which water, rising in the annular space between the exterior of the hollow boring rod and the sides of the bore-hole, creates an ascending current which carries up the triturated soil: the boring tube is then worked like an ordinary boring rod; and as the material is acted upon by the tool at the lower end, it is immediately carried up to the top of the bore-hole by the ascending current of water. It is a consequence of this operation that the cuttings being constantly carried up by the water, there is no longer any occasion to draw up the boring tube to clear them away, making a very great saving of time. Another important and certainly no less advantage, is, that the boring tools never get clogged by the soil; they work constantly (without meeting obstructions) through the strata to be penetrated, thus getting rid at once of nine-tenths of the difficulties of boring. In addition, it should be mentioned, that experience has shown there are no slips in any ground which ordinary boring rods can penetrate; that the boring tube works at 100 yards in depth with as much facility as when only ten yards down, and that from the very circumstance of its being a hollow rod, it presents more resistance to torsion than a solid rod of equal thickness and quite as much resistance to traction: these are the principal advantages of the new system of boring. Indeed these advantages have been fully confirmed by the borings which I have just completed at Perpignan. This boring was commenced on the 1st July and was completed on the 23rd, by finding the artesian water at a depth of 170 métres (560 English feet.) If from these twenty-three days, each of ten hours' work, are deducted three Sundays and six lost days, there remain fourteen days or one hundred and forty hours of actual work; which is upwards of 1 métre per hour, that is, ten times the work of an ordinary boring rod. In the method I have de-

scribed, it will be perceived that the water is injected through the interior of the boring rod. Experience has taught me that when gravel, or stones of some size are likely to be met with, it is better to inject the water by the bore-hole, and let it rise through the boring tube. The additional velocity which may be thereby given to the water, and the greater accuracy of calibre of the tube, allow the free ascent of all substances which may be found at the bottom of the bore-hole, and which the former mode of working may not so readily accomplish. I have brought up by this latter way stones of 6 centimétres long and 3 thick (2½ by 1¼ English inches.) The idea of making the water remount through the interior of the boring tube suggests an easy mode of boring below a film (sheet) of flowing water: it would be sufficient to close the orifice of the bore-hole hermetically, still, however, so as to allow the boring tube to work, but yet so that the flowing water should be always forced down to the bottom of the bore-hole to find its way to a vent: it would thus draw up and carry away all the detritus. If, in addition to the above, we consider the possibility of making the hollow stem of the boring rod of wood, and of balancing it so that it would weigh no more than the water in which it has to move, the problem of boring to depths of 1000 mètres (1100 yards) and upwards would appear to be solved. In the square of St. Dominique, at Perpignan, a boring had been carried on upon the old method for upwards of eleven months for the purpose of forming an artesian well, and the water had not been found." Fauvelle placed his new tube alongside the old boring tackle, and soon got down to a depth of nearly 100 yards when an accident occured which would have required some days to remedy. Fauvelle decided upon abandoning the bore-hole already sunk so deep, and commencing a new one, satisfied that there would thereby be a saving in time. The rate of sinking was equal to four English feet per hour of the time the hollow boring rod was actually at work, the depth of 560 English feet having been obtained in 140 working hours, for a bore-hole of about six English inches in diameter. M. Arago, who had seen the rods of Fauvelle at work, mentions how fully they answered, and that the large powerful tools at the bottom of the hollow boring rod cut easily through the hardest strata; he confirmed the fact of the large sized stones and gravel coming up with the ascending current, having himself watched them. He also mentioned, that such was the opinion of the people in the vicinity of Perpignan, and so much was water wanted, that orders for the sinking upwards of 200 artesian wells had been given to Fauvelle. The introduction of this system into this country, especially if combined with the Chinese or percussive system of boring, as practised with bore-holes of very large diameter, at the Saarbruck mines, and at many other places on the Continent, must be productive of great benefit, and would not merely effect a saving of money and labor, but the paramount advantage of immediately solving the question of the existence of coal, minerals, water, &c.

Sir JOHN GUEST asked Mr. Vignolles to explain the system of percussion boring, for the information of those gentlemen present who might not be acquainted with it.—Mr. VIGNOLLES said, instead of

boring with augers or rods, there was a heavy weight suspended by a rope and pulley; and fixed to the bottom of the weight was a tool of the crown form, viz., a circular tool of iron indented at the bottom. There was no description of rock on which he had tried it that this tool did not penetrate with facility. The prejudice of English workmen, however, had hitherto prevented its introduction in this country, but he had no doubt it would make its way, particularly if it could be combined with Fauvelle's system.—J. Lobb, Esq., Mayor of Southampton, wished to ask a question relative to the applicability of Fauvelle's plan to the boring of the Southampton artesian well. They had got to the depth of 1200 feet with a bore 6 inches in diameter, and the expenses had been nearly 20,000*l.*; this system, however, seemed to diminish the expense of boring in an extraordinary manner; and he wished to ask if it could be applied to the present boring at the Southamptom Common?—Mr. Vignolles, as an engineer, had no hesitation whatever in saying that it could be applied without difficulty. If they wanted force to send the water down the tube, they might use a steam-engine.—Dr. Robison suggested that a deputation from the Section should go to the works of the Southampton well, and inspect them.—Mr. J. Hill said that percussion had long been used in this country. They had used that plan whenever they came to hard substances in the Southampton boring. The rods were drawn up by a windlass, and dropped down a foot or six inches; and after the material was loosened the rods were drawn, and the pulverized material raised up by a cylinder.—Mr. Vignolles said this was different from the Chinese system of percussion, where a rope was used, which saved the trouble and loss of time in drawing the rods. The power required for sending down the water on Fauvelle's plan was much less than might be supposed.—The Marquis of Northampton suggested that a committee of the Geological Section should be invited to accompany the committee from this Section.—Dr. Lankester expressed his warm approval of M. Fauvelle's plan, and his opinion of its applicability. A conversation followed, in the course of which Sir John Guest said the weight of a hollow rod, three inches in diameter, and the iron a quarter of an inch thick, would be less than that of a solid rod of an inch diameter: the weight would be further lessened by the rod floating in water.—*Trans. Brit. Assoc.* Athenæum.

AMERICAN PATENTS.

List of American Patents which issued in the month of November, 1845,—with Exemplifications, by Charles M. Keller, *late Chief Examiner in the United States Patent Office.*

1. For an *Improvement in the Cultivator Tooth;* David B Rogers Stafford, New York, November 1.

The body and shank of the tooth is made of sheet metal swaged into the required form, the shank being so formed, that a horizontal section passing through that part of it which is inserted in the frame,

would represent a letter v, so that by driving into it, from the top, a properly formed wedge will secure it to the beam in all directions.

Claim.—"Having thus fully described my improvements, what I claim as my invention, and desire to secure by letters patent, is the shank of the tooth, so formed of thin metal as to receive a wedge in its recess, in the manner described, for the purpose of firmly connecting it with the beam in all directions, as set forth."

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2. For an *Improvement in Hats, such as are used by Firemen and Watchmen;* James Brown, Newark, New Jersey, November 1.

The patentee says:—"I make the body of my improved hats of wool, and by means of proper moulds, or blocks, I form upon their crowns any desired number of welts or ribs; these welts or ribs I fill on the inside with some hard substance which will cause them to preserve their form, and to resist the effects of a blow upon them."

This is claimed as an improvement on the well known method of making such hats of leather with welts or ribs.

Claim.—"Having thus fully described the nature of my improved hat, which is principally intended for the use of watchmen and firemen, I do hereby declare that I do not claim to have invented anything new in the manner of forming such hats, but what I do claim as new, and desire to secure by letters patent, is the manner herein described of forming or combining of welts or ribs with hats having bodies of wool; such ribs being strengthened by filling the inside of the same with any suitable material, in the manner set forth, by which combination I form a hat, as hereinbefore stated, of a material not hitherto considered as applicable thereto, and possessing the desirable properties of lightness, and of being brought into market at a cost far below those that have been heretofore made."

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3. For an *Improvement in Stoves, for Heating Apartments;* Jordan L. Mott, New York, November 1.

This is for improvements applied to a stove having Mott's feeder, for preparing and supplying the coal to the grate, placed below and back of the shelf on which the coal rests; and these consist in bulging out the back of the stove, so as to give it an inclination backwards from the bottom to the upper line of the grate, and thence from that line upwards, giving it an inclination forward.

Claim.—"What I claim is the combination of the feeder, as described, with the bulged form of the back. I further claim the drawing in the upper segment of the back, over the coal, in combination with the shelf above the grate, and this I do claim without reference to the bulging of the lower segment."

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4. For an *Improvement in the Kitchen Range;* Jordan L. Mott, New York, November 1.

This range has two ovens with the fire chamber between them, the draught from the fire chamber being first over the top of the ovens, down

the side near the front, then under the bottom to the rear, then up the back to the connexion with the flue leading to the chimney. In this way the draught, by means of dampers, can pass around both, or either of the ovens. To facilitate the operation of cooking, stationary boiler holes are placed over one oven, and a rotary top over the other, and extending partly over the fire place.

Claim.—"What I claim is the *combination*, as follows: The top range or stove, furnished with both *rotary boiler plates and stationary boiler openings* in combination with the *divided draught*, by which the *heat* can be made to act either on the rotary plate or the stationary boilers, or both, at pleasure, by merely changing the dampers."

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5. For an *Improvement in the Corn Cutter and Grinder;* James P. Ross, Lewisburg, Pennsylvania, November 1.

The corn and the cob are cut by a series of eccentric or circular saw plates on a shaft, the teeth of which pass between permanent bars forming a comb, and when thus cut the pieces are delivered to a conical mill, where the whole is properly ground.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the series of eccentric or regular saw plates on the cylinder, in combination with the comb, for the purpose of cutting corn in the ear, or other substance, substantially as herein described, and in combination therewith. I also claim the conical mill for grinding the grain, &c., after being cut, substantially as herein described."

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6. For *Improvements in the Cart;* Thomas Mussey, New London, Connecticut, November 1.

We are under the necessity of omitting the claims in this case, as they are wholly dependent on the drawings; they are however limited, the first, to an arrangement of a windlass, cog wheels, straps, &c., by which the forward part of the cart can be lifted to tilt out the load, the cart being made so as to place the greater part of the load forward of the wheels—and the second to an arrangement of the tail board with levers and connecting straps by which the tail board is held up, as the body of the cart is tilted.

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7. For *Improvements in the Machine for Boring Timber;* Andrew Weikart, Green Village, Ohio, November 1.

This improvement is for an arrangement of parts for securing the frame of the boring machine to the timber to be bored, and the general nature of the mechanical arrangement for this purpose can be clearly gathered from the following;

Claim.—"What I claim as my invention, and which I desire to secure by letters patent, is the combination of the strap, metallic plates, or bars, connected by a cross bar, and suspended on pivots, levers, and nicked plate, as set forth, for securing the machine to the timber to be bored, said strap being hooked to the lever and passed under

the timber, around the rollers, and between the bar and the side of the box, as described."

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8. For an *Improvement in the Manifold Writing Desk;* John White, Marshall, Michigan, November 1.

Claim.—"What I claim as my invention, and which I desire to secure by letters patent, is combining the internal escritoir with the external folding desk, in the manner and for the purpose set forth."

The escritoir is a case for containing papers, books, &c., which slides up and down in the main frame, and this is surrounded with folding desks for writing.

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9. For an *Improvement in the Apparatus for Tanning Leather;* Francis D. Parmelee, Akron, Ohio, November 1.

The vats in which the hides are suspended are so constructed and arranged as to permit the liquor, which has acted on the hides, to run off, and above these vats there is a traversing carriage which delivers the ooze on to the hides.

Claim.—"Having thus fully described my apparatus for tanning hides, what I claim as my invention, and desire to secure by letters patent, is the combination of a traversing carriage for distributing the ooze on the hides, substantially as above described, with a vat or vats, in which said hides are suspended, and from which the spent liquor can drain."

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10. For an *Improvement in the Brake for Arresting Carriages;* William Dunning, Dunningsville, Pennsylvania, November 1.

Claim.—"Having thus fully described the construction and operation of my improvement, what I claim as new therein, and desire to secure by letters patent, is the useful combination of the brake or rubber with a shaft or shafts, joined to the goosenecks by a rule joint, in the manner and for the purpose herein set forth and fully made known."

The shaft (or shafts) is jointed to the goosenecks by rule joints, so that it can bend up and back, but not down, and the sliding brake is jointed to the shaft by a connecting rod, so that in going down hill the weight of the carriage shall force the brake against the wheels, and thus arrest the downward motion of the carriage.

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11. For an *Improvement in the Splints for Setting Fractured Limbs;* William Mills and Mahlon Hoar, New Athens, Ohio, November 8.

Claim.—"What we claim as our invention, and desire to secure by letters patent, is the construction of a fracture apparatus with four adjustable slide-splints, connected with each other by means of circular metallic hoops or bands, the upper and lower sets of splints being connected by means of the quadrant hinge joint and the ankle joint, similarly constructed. We do not claim these parts separately, but in combination, as above described."

12. For an *Improvement in the Method of Mounting Hatters' Kettles;* Russel Wildman, Hartford, Connecticut, November 8.

Claim.—"What I claim as new, and desire to secure by letters patent, is the arrangement of the draught in combination with the stoke flue, by which the smoke flue becomes the stoke flue, in the manner described."

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13. For an *Improved Arrangement of the Apparatus for Bleaching Cotton, &c.;* Moses Pierce, Norwich, Connecticut, November 8.

Claim.—"I am aware that the washing machine, the keir for boiling, first in lime and then in an alkali, the "chemics" or vats for containing the chlorine, and the "sours" or vats for containing the acid solutions, have all heretofore been used separately, the pieces of fabric being attached together to introduce them to the washing machine, and then separated to transport them by hand to the keir, and then re-transported and re-attached, to rewash them, and the same with reference to the chemics, and sours, and the washer, the whole of these operations of attaching, detaching, conveying, and reconveying being done by hand; and therefore I wish it to be distinctly understood that I do not claim as my invention the using of these in succession in the process of bleaching, nor do I claim the passing of wet fabrics from a tub or vat, between rollers, to force out the liquid, as this combination has heretofore been known and used; but what I do claim as my invention, and desire to secure by letters patent, is combining the washing machine with the keir, by means of carrying rollers or belts, provided with a reversed motion, so that the fabrics can be conveyed from the washer to the keir, and back from the keir to the washer, as herein described.

"I also claim combining the washer severally with the chemics or vat for containing chlorine, &c., in the manner described, so that the fabric may be conveyed from the washer to the chemics and the squeezing rollers, as herein described, and, in combination with this last combination, the arrangement of the "sours" or vats for containing the acid solution, and the set of squeeze rollers which receive the fabrics from the sours after they have been conveyed therein from the first set of squeeze rollers, and reconveying them to the washer, as herein described.

"And, finally, I claim combining together the washing machine, the keir, and the chemics, the first set of squeeze rollers, the sours and the second set of squeeze rollers, in the manner described, by means of which the various operations in the process of bleaching are connected together, so as to convey and reconvey the fabrics from the one to the other in the order required, substantially as herein described."

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14. For an *Improvement in the Ink holder or Inkstand;* Daniel Harrington, Philadelphia, Pennsyivania, November 8.

Claim.—"Having thus fully described the nature of my improved ink holder, and shown the operation thereof, what I claim therein as

new, is making the rotary top of the ink holder, with pen holes, and a cup-formed recess in the middle, fitting in a large central opening in the permanent top, which is also provided with pen holes, in like manner, as the rotating top; when the two are combined by means of the spring handle, which secures the two together, and affords an easy and ready mode of removing the top to supply ink, whilst it answers the purpose of a ball handle, to carry the ink holder.

"And I do hereby declare that I do not intend to limit myself to the particular form of the respective parts, as herein set forth and represented, but to vary these as I may think proper, whilst the general form and combination are substantially the same with those herein fully made known."

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15. For *Improvements in Machinery for making Lead Pipes;* Nathan Buttrick, Jr., Chelmsford, Massachusetts, November 8.

Claim.—"Having thus described my invention, I shall claim the above described peculiar manner in which I arrange the cylinder with respect to one or two melting cisterns, and the furnace whereby the said cylinder is heated wholly or partially by the fire of the furnace, and receives its supply of lead, as above specified.

"I also claim the combination of the air chamber with the forcing cylinder, and the pipe former, in the manner and for the purpose or objects as above specified.

"I also claim the arrangement of the air chamber, within, or partially within, the melting cistern or cisterns, for the purpose of melting any lead which at any time may congeal, or may have congealed, within the said air chamber, the said lead being rendered fluid by means of heat proceeding from the molten lead of the kettles, and passing through the sides (or a portion thereof) of the air chamber."

The cylinder from which the lead is to be forced, is surrounded by a furnace, and provided with a piston to make the force pump double acting, and on each side of the cylinder, and partly within the furnace is placed a melting kettle, the two communicating by apertures with the cylinder, which is also connected with an air vessel above, from which projects the tube or die with a core within for forming the pipe.

As the piston moves in one direction, the pipe leading from the cylinder to the air vessel is open, which permits the molten lead to pass into the air vessel, and by the elasticity of the air is forced through the die, the opposite end of the cylinder being in the mean time supplied with lead from the other kettle preparatory to its operation on the return of the piston.

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16. For an *Improvement in the Cooking Stove;* called the "Improved Empire"—John R. Chollar, Eber Jones and Peter Low; Troy, New York, November 8.

The patentees say,—"The nature of our invention consists, first, in the method of attaching the hearth of the fire chamber to the stove without casting any projections on the stove plate, by providing a

flanch to the bottom and sides of that part of the hearth which is towards the stove, and to bear against the stove plate, and with another flanch beyond the first sufficiently far to pass within the stove plate and hang on it; in this manner the hearth is sustained by having the edge of the stove plate embraced between the two flanches. And, secondly, in uniting the oven bottom with the stove bottom in such manner as to form the flues with cemented air-tight joints, the stove bottom being provided with two vertical plates which extend up to the oven bottom composed of three plates, with the edges bent down and resting against the sides of the vertical plates projecting from the stove bottom, the junction of the edges of the plates being such as to form channels for the reception of cement of any kind to render the joints air-tight.

"We claim the method, herein described, of forming the oven bottom, and uniting it with the flue division plates, by the bent or curved edges of the plates forming the oven bottom, and fitting against the division plates of the flues in such manner as to receive a cement to render the joints air-tight, substantially as herein described."

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17. For an *Improvement in the Instrument for Extracting Teeth;* John W. Baker & William W. Riley, Columbus, Ohio, November 8.

This is for combining the hook with the forceps handles, by having the hook turn on the end of one of the handles, whilst its upper end or projection is jointed to the end of the other handle, so that the working of the handles will open and close the hook.

Claim.—"What we claim as our invention, and desire to secure by letters patent, is the combination of the forceps handles, with the manner of controlling the hook, substantially in the manner and for the purpose described."

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18. For an *Improvement in the Machine for Mortising Sash Stuff;* Almon Doures, St. Clair, Michigan, November 8.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the combination of the mallets and spring-hooks with the treddles for operating the mortising tools; that is to say, I claim attaching spring-hooks, having their lower ends tapered, to the sides of the sliding mallets, which, on the descent of the said mallets, come in contact with stops or cans on the frame, by which the direction of the hooks is changed inward, causing the hook to pass under the head of the cutting tool simultaneously with the descent of the mallet, so that when the mallet is again raised with the hook, it draws up with it the cutting tool to the desired height, when the hook by its tapered form and effort to assume its original position, recedes from the cutting tool, until it is entirely liberated from it."

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19. For an *Improvement in the Plough;* John Ball, Greentown, Ohio, November 8.

Claim.—"I make no claim to securing the parts by a single bolt; but what I do claim as my invention, and desire to secure by letters patent, is the combination of the point, cutter, and mould-board, by means of the mortises in the point and the cutter, the tenon on the lower edge of the cutter, and the dovetail tenon on the land side of the mould-board, so as to unite them and render them more permanent and durable than ploughs now in use."

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20. For *Improvements in Smut Machines;* Joseph Johnson, Wilmington, Delaware, November 8.

Claim.—"Having thus fully described my improvement, I wish it to be understood that I do not claim as my invention the close cylinder, having projections thereon, nor do I claim constructing the concave with projections from its inner surface; but what I do claim as my invention, and desire to secure by letters patent, is the combination of a *close* cylinder, not admitting air at the ends, constructed, as above set forth, with a concave, having vertical projections thereon between the rows of holes in the said concave, in the manner and for the purposes herein described and in contradistinction to an *open* cylinder, with said projections combined.

"I also claim the fan, constructed in the manner described, with inclined heads to the case, for the purpose described, in combination with the smut machine, all arranged as herein set forth."

The fan is constructed in the usual manner, but the heads are inclined for the purpose of forming a reservoir of air at each end, one communicating with a vertical trunk which supplies air to the upper end of the fan, and the other with a separating trunk to clean the chaff and dirt.

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21. For *Improvements in the Machine for making Cultivator Teeth;* David B. Rogers, Stafford, New York, November 8.

In this machine the tooth is sweged between dies, and by the same operation the piece of iron, of the required form, is cut from a plate by combining with the dies cutters or shears which project beyond the surface of the dies, and which are so formed as to commence the cut in the middle of the plate.

Claim.—"Having thus fully described my improvement, what I claim therein as new, and desire to secure by letters patent, is the combination of the cutter or shears, projecting down in the centre, so as to commence cutting in the middle of the plate, with the die forming the teeth of the cultivator, substantially in the manner and for the purposes set forth."

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22. For an *Improved Illuminating Vault Cover;* Thaddeus Hyatt, New York, November 12.

Claim.—"Having thus fully described the nature of my improvements, in the illuminating vault cover, what I claim therein as new, and desire to secure by letters patent, is the combining with the covering plate a series of glasses of any suitable form, or of lenses; said

combination being effected substantially in the manner described, by the aid of laminæ of wood, or of soft metal, and the glasses or lenses being defended from injury by knobs, or protuberances, as herein set forth."

The glasses, which are conical, are let into wood, and the wood then secured to an iron frame with the large part of the glasses downwards, and their edges resting on the edges of the holes in the metal plate. Between each glass there is an iron projection to prevent the surface of the glasses from being scratched.

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23. For *Improvements in Machinery for making Barrels, Casks, &c.;* John Miner and Silas Merrick, Fallston, Pennsylvania, November 12.

We are under the necessity of omitting the claims, as they could not be understood without the drawings. The first section relates to the construction of two sets of arms on opposite ends of a shaft, each arm being provided with appropriate instruments for griping the staves to be presented to the action of a reciprocating plane. The second part is limited to the combination of parts employed in holding and presenting the staves to the crozing, &c. tools. And the third claim is limited to the arrangement of the saws (for jointing the staves), on inclined shafts, in combination with the carriage which carries the staves, and inclined planes or arms at each end which reverse the motion thereof and render the machine self-acting.

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24. For *Improvements in Machinery for Cutting Tenons;* James Briggs, New York, November 12.

The claims in this case could not be understood without the drawings, and we are therefore under the necessity of omitting them.

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25. For an *Improvement in the Cooking Stove;* R. Peck and J. W. Cochran, Attica, New York, November 12.

Claim.—"Having fully described our improvements, what we claim as new, and desire to secure by letters patent, is the combination of the variable fire-chamber with the boiler, constructed and arranged as described."

The front of the grate slides in and out horizontally, to vary the size of the fire chamber. The boilers are made with compartments which descend into the fire place, so as to extend the fire surface.

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26. For *Improvements in Locks for Safes, &c.;* Henry Isham, Montpelier, Vermont, November 12.

Claim.—"I do not claim the series of notched circular plates, &c., simply; but that which I do claim is the combination of the geared change wheels or plates, &c., with the said notched plates applied to them, and acting in connexion with them, and operated by an arber and tooth, or cam, or other mechanical equivalents, substantially in the manner as above described.

"I also claim the combination of mechanism by which the tongues or projections of the latch are kept from contact with their respective circular notched plates, when the main bolt is locked or thrown forward, the said combination consisting of the balance or fly wheel, chain, and spring, or other mechanical equivalents, the slide-plate, lever, (connected to the slide) and the slide, the whole being arranged and operated by the arbor and its tooth, substantially as above set forth."

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27. For a *Machine for Writing, called the "Chirographer;"* Charles Thurber, Norwich, Connecticut, November 18.

The patentee says,—"The nature of my invention consists in communicating to a pen or pencil holder, the motions necessary to delineate any and all letters or other characters, by motions at right angles to each other, obtained by sets of cams, each set being so formed as to combine the right angle movements, and thus generate the vertical, horizontal, oblique, and curved lines required to delineate the letters or characters. Each set of cams is actuated by a separate and distinct lever or handle, as in a piano forte, and the table with the paper, &c., caused to move forward the required distance at the termination of each letter or character by the return motion of the lever or handle.

Claim.—"Having pointed out the principle of my invention, and the manner of constructing and using the same, and indicated some of the variations in construction, which may be made without changing the principle or character which distinguishes it from all other things before known, what I claim as my invention, and desire to secure by letters patent, is communicating the motions to the pen or pencil by means of cams acting on frames, so that the vertical and horizontal strokes can be given by separate movements, and the oblique and curved strokes by the combined action of the two, substantially as herein described.

"And I also claim giving to the sheet of paper, or other substance to be written upon, a horizontal movement for spacing off the letters, and a vertical movement for the lines, in combination with the movements of the pen or pencil, substantially as herein described."

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28. For an *Improvement in the Bee Hive;* Christopher Suidam, Lambertville, New Jersey, November 18.

The inclined shelves are provided with tubes, along which the moth will pass, and these communicate with a space surrounding the drawers which are made double for that purpose.

Claim.—"Having thus fully described my improvements, what I claim therein as new, and which I desire to secure by letters patent, is the combination of tubes, as described, on the inclined planes, with the double shell of the drawer, in the manner and for the purposes set forth."

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29. For *Improvements in the Portable Forge;* Christian V. Queen, Peeksville, New York, November 18.

The forge is provided with shutters, which slide around to enclose the fire place when not in operation. The forge fan is provided with a pipe which communicates with the bellows, and from this pipe there is a branch provided with a valve, so that air can be admitted to the fire, when the bellows is not at work.

Claim.—"Having thus fully described the manner in which I construct my portable forge, and arrange the respective parts thereof, what I claim therein as new, and desire to secure by letters patent, is the combination of the curved sliding-shutters for enclosing the space over the fire, and the device for admitting a draught of air to keep up the combustion during the intervals in which the bellows are not employed; the same being effected for the purpose and substantially in the manner made known."

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30. For *Improvements in the Cooking Stove;* John Porter, Gettysburg, Pennsylvania, November 18.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the combination and arrangement of the fire chamber and roasting oven, having doors opening into the fire-chamber when direct radial heat is required in the oven.

I also claim the combination of the boiling apartment and baking-oven, constructed in the manner set forth."

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31. For an *Improvement in the Manufacture of Hat Bodies of Wool or Fur*; Marmaduke Osborne, New York, November 18.

Claim.—"Having thus described the nature of my improvement, in the manner of forming hat bodies of wool, fur, or other suitable material, what I claim as new therein, and desire to secure by letters patent, is the manner herein set forth of saving the labor of reblocking and of ironing such bodies, by interposing between them and the block a material to which resinous stiffening will not adhere, or to which, if it adhere, said material will not adhere to the block; by which device, in either case, the body may be allowed to dry upon the block, and may be removed therefrom in perfect form."

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32. For an *Improvement in the Trucks for Railroad Cars;* Levi B. Thyng, Lowell, Massachusetts, November 18.

The spring bolster rests at each end on springs suspended by shackles from the sides of the frames, to admit of easy play in all directions.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the mode, herein described, of hanging the car body, and governing its lateral motion; that is to say, the spring-bolster constructed and governed in its motions substantially as herein described, in combination with the springs and shackles; the whole being constructed and operating substantially as herein set forth."

33. For *Improvements in Machinery for Condensing and Laying Cotton Slivers;* John Tatham and David Cheetham, England, November 18.

The delivery apparatus is placed eccentric with respect to the centre or axis of the receiving cam, which is caused to revolve very slowly in the contrary direction to the delivery apparatus.

Claim.—"We claim the combination with a cam, or other mechanical equivalent of mechanism, substantially as set forth, for laying a sliver therein in eccentric helices, as above described; also the combination with the above of a corresponding frame or plate, disposed over it and operating so as to condense the material, or force it into the cam, as above specified."

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34. For *Improvements in Machinery for Manufacturing Shirred India Rubber Goods;* James Bogardus, New York, November 21.

The patentee says,—"The nature of my improvement consists, first in making the rollers between which the fabric is formed, of metal or other hard substance with their surfaces grooved in the direction of their periphery, to correspond with the number and size of the India rubber strips and the spaces between them, the strips passing in the grooves, and the two pieces of cloth being pressed together between them by the ridges, and the grooves being of such depth as to insure sufficient pressure to cause the pieces of cloth to adhere to the pieces of India rubber. And, secondly, in connecting the feed rollers, (which supply the strips of India rubber at a velocity less than the passage of the completed fabric between the grooved rollers to distend them), with the gearing which communicates the feeding motion by means of a ratchet to admit of turning back the feed rollers at the commencement of each operation, for the purpose of distending the strips between the feed rollers and the grooved pressure rollers."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the method, herein described, of uniting the various parts in making shirred or corrugated India rubber fabrics, by passing the cloth and strips of India rubber between pressure-rollers, one or both of which is grooved in the manner described to receive the strips of India rubber, and make pressure on cloth between the strips, as herein described.

And I also claim connecting the driving feed roller with the gearing which drives it, by means of a ratchet, to admit of turning it back to stretch the strips of India rubber, when this is combined with pressure rollers, the peripheries of which move with greater velocity than that of the feed rollers, as herein described."

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35. For an *Improvement in the Method of Curing Smoky Chimnies;* John Plant, Washington, D. C., November 21.

Claim.—"Having fully described my improvements, what I claim as my invention, and desire to secure by letters patent, is, first, forming a recess in the breast of a chimney, over the arch of the fireplace, for the reception of external air, and delivering the same in a

thin stratum, as herein described, the whole width of the arch, in the manner and for the purposes above set forth.

I also claim gathering the throat of the flue, as above described, by curving out from the side that the flue is to be carried up on, and curving the other side up over it, as above specified."

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36. For a *Machine for Slitting India Rubber;* James Bogardus, New York, November 21.

The patentee says,—"Instead of attaching the cutting wheels to the shafts permanently, they are put on by means of a feather so as to turn with the shafts and yet slide thereon freely; in this way the edges of the two series where they pass between each other, can be kept in close contact by the turning of a nut on the end of one of the shafts, for the turning of this nut must of necessity act on all the wheels of the two series.

I am aware that a series of cutters, or disks, have been secured on a shaft by means of a nut, and therefore I wish to be distinctly understood that I do not claim this as my invention; but what I do claim as my invention, and desire to secure by letters patent, is the method herein described of adjusting the cutter edges of two series of cutting wheels, which fit between each other, by having each series to slide endwise on a shaft, so that the edges of the two series can be forced into contact by a nut, wedge, spring, or other analogous device, as herein described.

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37. For an *Improvement in Spindles for Spinning;* Alexander Anderson, Paterson, New Jersey, November 21.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is extending the tube below the traverse rail, in the manner and for the purpose set forth."

The object of extending the tube below the rail is the better to steady the spindle, and enable it to work steady at very high velocities. This is claimed as an improvement on the Gore tube, so called from the name of the inventor.

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38. For an *Improvement in Pianos;* William T. Senior, New York, November 21.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the introduction of the arch in the middle of the bottom, whereby I am enabled to obtain great power of resisting the strain caused by the tension of the wire strings of the piano forte, besides other advantages in improving the qualities of the instrument by keeping the case always in shape, so that it cannot draw up or "wind," as is invariably the result in the present mode of manufacture, and consequently keeping the instrument in tune and order for a much longer period."

This improvement consists in so arranging the planks and timbers that the interior or middle layer shall form an arch springing from an abutment at each end, on the under side coming together at the

middle and joining at the top, thus applying that principle in obtaining increased strength and power of resistance.

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39. For an *Improvement in the Rotary Planing Machine;* Joseph E. Andrews, Boston, Massachusetts, November 21.

Instead of carrying the board to be planed to the rotating plane by means of feed and pressure rollers, as in the Woodworth machine, there is an endless belt of strips or slats on which the board is placed, and two similar belts, but shorter, above the board and pressed on to it. The motion of these belts feeds the board, the upper ones making pressure on it to prevent it from being lifted up by the action of the plane.

Claim—"Having thus fully described the manner in which I construct my planing and jointing machine, and shown how the respective parts thereof operate, what I claim therein as new, and desire to secure by letters patent, is the manner herein set forth of forming, arranging, and combining with the revolving cutter wheel, the revolving platform, and the endless aprons between which the board to be planed is to be passed; by means of which arrangement and combination it is firmly held along the whole length of such apron, and carried regularly forward, without deviation."

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40. For an *Improvement in Stoves;* Eli C. Robinson, Troy, New York, November 26.

Claim.—"What I claim, and desire to secure by letters patent, are the flue passages across the top of the stove for the fire and heated air, after the same have been made to pass round the oven, and up to the top of the flue in front of the fire-place, to be continued to the stove pipe, as above described."

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41. For an *Improvement in the Method of Letting down and Raising Propellers;* R. F. Loper, Philadelphia, Pennsylvania, November 26.

The patentee says,—"My invention consists in attaching two screws to cog wheels on the deck of the vessel, which mash into a large cog wheel on the drum of a capstan, the threads of the screws taking into nuts formed in the sliding frame of the propeller, the sides of which frame are bored out cylindrically to a certain depth, to admit the screws to pass therein, and to protect them from the action of the salt water deposits and rust, which would otherwise prevent their working."

Claim.—"What I claim as my invention and desire to secure by letters patent, is combining the elevating screws with the frame of the propeller, by means of openings therein to receive the same, so constructed as entirely to exclude the surrounding water from that part of the screws which is within the frame, the whole being constructed and arranged substantially as herein set forth."

42. For *Improvements in Water Wheels:* William Dripps, Coatsville, Pennsylvania, November 26.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is making the apertures in the wheel, for the introduction of the water to the buckets, to extend through the outer or cylindrical perimeter thereof, near the top, and then spirally down through, between the buckets, to the bottom thereof, in the manner described, in combination with the funnel-shaped inner rim and curved buckets, as set forth, whether the water be introduced from the inside or outside of the wheel, as before stated.

"I also claim the combination of the sliding frame, and segment valves connected therewith, by rods or stems of unequal lengths, for letting on the water by degrees, in the manner set forth."

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43. For an *Improvement in the Truss Frames of Bridges;* Nathaniel Rider, South Bridge, Massachusetts, November 26.

Claim.—"I claim the mode of producing the camber of the truss, viz: by the distension wedges, or apparatus, as above described, applied between the ends of the bars of the upper stringer, or chord, in *combination* with the contractile and cambering chain, made and applied to the lower or other suitable part of the truss, and operating substantially as above specified."

The wedges are applied at the junctions of the pieces composing the upper stringer of the arch, and below the arch there is a chain made in two parts, and connected by a swivel screw, for the purpose of shortening the chain which supports the arch.

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44. For an *Improved Method of Indicating the Height of Water in Steam Boilers;* George Faber, Canton, Ohio, November 26.

The patentee says,—"My invention consists simply in attaching a magnet to the axis of motion of a wheel or lever, to which the float is suspended or attached, to communicate motion by attraction and repulsion, to an index needle turning on an axis outside the boiler, and separated from the magnet by a steam-tight plate."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the method herein described, or any other substantially the same, of indicating the rise and fall of water in a steam boiler or generator, by means of an indicator outside thereof, actuated by a magnet, connected with a float or any other body within the boiler, that rises and falls with the water, and connected with the magnet, substantially as herein described."

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45. For an *Improvement in the Steam Engine;* R. F. Loper, Philadelphia, Pennsylvania, November 26.

The patentee says,—"The nature of my invention consists in rotating two crank shafts with equal velocities, and in opposite directions, by means of a connecting rod, extending from the cross-head of a steam engine to the two crank shafts, the centre of vibration of the cross-head being centrally between them."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is connecting the cross-head of a reciprocating engine with two crank shafts on opposite sides of, and at equal distances from the centre of vibration, by means of a connecting rod or lever turning on the cross-head, and reciprocating with it, and taking hold of the cranks on the two crank shafts, by which they are caused to turn in opposite directions, and with equal velocities, as herein described."

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46. For an *Improvement in Propelling Vessels;* Stephen R. Parkhurst, New York, November 26.

Claim.—"Having thus fully described my improvement, I wish to be understood that I do not claim as my invention the employment of a submerged horizontal wheel within a case in the vessel, as that has before been essayed; but what I do claim as my invention, and desire to secure by letters patent, is the case, above described, into which the propellers are inserted, to be placed on the outside of a vessel, of the usual form of sailing vessels, which is independent of and can be taken from said vessel, in combination with a series of horizontal propellers placed one before the other, in the manner set forth."

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47. For an *Improvement in Washing Machines;* Grey Utley, Chapel Hill, North Carolina, November 26.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the manner of attaching pressers to the levers, by the rods and cords, so as to produce the effect stated."

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48. For an *Improvement in the Plough;* Patrick Gallagher, Chambersburg, Pennsylvania, November 26.

Claim.—"I do not claim adjusting the clevis with a screw and moving swivel hook, as in the "Gallatin plough;" but what I do claim as my invention and improvement, and which I desire to secure by letters patent, is the mode of raising and lowering and confining the ring against the inner side of the front or vertical part of the clevis, by means of a segment grooved wheel, or head, raised and lowered by a vertical screw turning in a female screw, in the upper or horizontal part of the clevis, by which combination and arrangement the weakening of the clevis, arising from the necessity of cutting the usual notches in it for holding the ring, is avoided, and the dropping of the ring is prevented; the said segment grooved wheel holding the ring against the front part of the clevis at the height desired, and made adjustable to any required level, for various depths of ploughing, as set forth."

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49. For a method of *Propelling Boats or Rail Road Cars;* Josephus Echols, Columbus, Georgia, November 26.

The patentee says,—"By placing the compensating wheel at the bow where the water must be displaced, the deflection of the water

communicates available power to the wheel which may be advantageously applied to aid in the propulsion of the boat, or applied to any other purpose."

Claim.—"Having thus described the principle of my invention, and the various modes in which I have contemplated its application, I wish it to be understood that I do not claim the propelling of boats, &c., by the reaction of issuing streams of water, when effected by steam or other power, on the boat, &c.; but what I do claim as my invention, and desire to secure by letters patent, is the method of propelling boats on canals, or cars on railroads, by means of a column or columns of water discharged from an upper level or reservoir (not moving with the boat) to a lower level, by means of a syphon or syphons, attached to and moving with the boat, or car, in manner substantially as herein described."

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50. For an *Improvement in Tailors' Measures;* Abm. A. Bogardus, Newbury, New York, November 29.

Claim.—"Having thus fully described my improvement, what I claim as my invention, and desire to secure by letters patent, is the combination of the scale of subdivided measures, and the protractor, in the manner described, so that the angles for laying out any sized coat shall be given by the protractor from the points found, by measuring the person to be fitted by means of the scale: as set forth."

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51. For an *Improvement in Stoves;* William Butcher, Philadelphia, Pennsylvania, November 29.

Claim.—"What I claim as my invention, and which I desire to secure by letters patent, is preventing the fire and ashes escaping from the stove through the draught openings, by dividing the base or lower box of the stove into a number of apartments, communicating with each other, formed by a horizontal perforated plate, and vertical perforated plates, in the manner and for the purpose set forth."

List of American Patents which issued in the month of April, 1842 *—with Exemplifications, by* CHARLES M. KELLER, *late Chief Examiner of Patents in the U. S. Patent Office.*

Continued from Page 319.

13. For *Improvements in Vinous Fermentation;* Charles C. Edday, Benton, Missouri, April 1.

The patentee says,—"The nature of my invention consists in bringing up the heavier portion of the grain, or fermentable matter from the bottom to the top, and conveying down the lighter or more fermentable matter from the top to the bottom, or suspending the heavier portion at the top, or at any point within the tub that may be desired, and carrying the lighter or more fermentable part of the fermentable matter to the bottom, or suspending it at any point within the tub at plea-

sure, and thus acting on every point alike at the same time until all has undergone thorough fermentation."

Claim. "What I claim in the foregoing, is, the mode of accelerating and perfecting vinous fermentation in close vessels herein set forth, that is to say, I claim the returning of the lighter and more fermentable matter which floats on the surface of the mash in the fermenting tun to the bottom of the same, and bringing up from the bottom to the top the heavier parts of the fermentable matter, and exposing it to the action of the gas, while it is emptied out of the buckets into the centre of the tub, and also the returning or forcing of the gas by means of force pumps, or any and all the modes herein set forth, and returning the gas as a ferment, and to all other purposes to which it may be converted, using the wheel with the buckets, or the cylinder with the gas, or any other mode herein set forth substantially the same, also the horizontal tub and the method of applying the steam through the hollow shaft for scalding the grain or fermentable material."

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14. For an *Improvement in Weavers' Temples*; Josiah Beard and Abram Whitney, Waltham, Massachusetts, April 6.

This is for the combination of the rotary and jaw temples, the latter being so situated that it gripes the cloth between the former and the reed, as the holding of the cloth between the reed and rotary temple presents the selvages in a better condition to the gripe of the jaw temple.

Claim.—"Having thus explained our invention, we shall claim the combination of the revolving and jaw temples arranged together as above described, and operating so that the selvage of the cloth, intervening between the reed and the revolving temple, shall be grasped and firmly held during the process of weaving, in manner, and for the purpose before set forth."

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15. For an *Improved method of fastening the Nibs on Scythe Snaths;* Thomas W. Harvey, of New York, assigned to Samuel Garfield, Senior, April 6.

Claim.—"Having thus fully described the nature of my invention, and shown the manner in which the same is carried into operation, it is to be understood that I do not claim to have invented either of the parts of the snath, nib or handle taken individually; but what I do claim is the particular manner in which I have combined these with each other, so as to form and constitute what I have denominated the double fastened nib: that is to say,

"I claim the employment of a bolt, which is furnished with a screw at each end, one end of which is to be screwed into the part of the ring and to bear upon the clip; the other end is to receive the nut after the handle has been placed thereon, thus forming the double fastening as set forth.

"I claim the foregoing in combination only, together with such variations thereof as are substantially the same in construction and operation."

16. For an *Improvement in Air-tight Stoves;* Zephaniah Bosworth, Marietta, Ohio, April 6.

We omit this claim, as it refers to, and could not be understood without, the drawings. It is limited to the combination of diving flues in the corners that extend from the upper part of the combustion chamber to a false bottom below, provided with an exit pipe that leads to the chimney, and a door to admit air, by means of which the draught can be regulated at pleasure.

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17. For an *Improvement in Bee Hives;* Shadrack Trumbull, Suffield, Connecticut, April 6.

Claim.—"What I claim as my invention and desire to secure by letters patent, is a new and useful improvement in bee hives, in the construction and arrangement of a box with two apartments, the largest of which is to receive boxes, the other for bees to ascend to the hive above, and at the base to communicate with the inner boxes. This box or hive is intended to accommodate old swarms, by placing the hive which contains the swarm above, and this beneath, which will furnish the bees with sufficient room at all times without injury to them or causing their destruction, as herein described."

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18. For *Improvements in the Corn Planter and Cultivator;* Samuel Brady, Salorne, Clinton County, Pennsylvania, April 6.

The claims in this case could not be exemplified without drawings, which would necessarily be complex.

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19. For a preparation for *Cleansing the head of Dandruff;* James Mackay, a British subject, now residing in New York, April 6.

"The following is the specification, viz:—The ingredients are as follows: the liquor from carrots, rum or spirits, sweet oil, and the oil of bergamot, the mode of preparing being in about the following proportions. To half a pint of liquor (which may or may not be clarified) in which half a pound of carrots has been boiled soft, add one gill of rum or spirits, half a gill of sweet oil, and twelve drops of the oil of bergamot; the above I claim as my invention, and desire to secure the same by letters patent."

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20. For *Improvements in the Harvesting Machine for Cutting, Thrashing, Winnowing, &c., Grain;* Charles Brown & Francis S. Crans, Barton, New York, April 6.

The patent is granted for an improvement in the method of discharging the grain from the teeth of the cutting part of the machine, which consists of a wheel with small scythes projecting from the wheel, with rake teeth ranged above each scythe to hold on to the grain, and the improvement consists in the peculiar arrangement of sets of teeth attached to the ends of levers, each set playing between each rake over the scythes, and these are so operated by a cam and segment, that as each rake passes by the place of deposite, the clearers are

moved out from the periphery of the wheel to the end of the rake teeth to discharge the grain, and then back for a repetition of the operation.

Claim.—" We do not claim as our invention merely discharging the grain from the teeth or rake by means of other fingers passing between them, as this has been done before by stationary fingers; but what we do claim as our invention, and desire to secure by letters patent, is the mode of discharging the grain from the rake by means of the movable discharger, operated by the cam and segment as herein described."

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21. For an *Improvement in the Extension Rocking Chair;* Charles L. Bauder, Utica, New York, April 6.

The seat of the chair slides in the frame, and is jointed to the back of the chair which is in like manner jointed to the upper part of the frame, so that in sliding forward the seat, the back is inclined—a support frame for a foot board slides in the seat so that it can be drawn out when desired to support the feet.

Claim.—"What I claim as my invention, and which I desire to secure by letters patent, is the combination of the sliding rest frame and seat, and the combination of the foot board and rest frame as before described."

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22. For an *Improvement in Spring Saddles;* David Irvin, Madison, Wisconsin Territory, April 11.

The cantle and pommel are united by two steel springs fitted to the horses back and the forward part of the cantle between the two springs is provided with a projection to which the webbing is attached.

Claim.—" What I claim as my invention, and desire to secure by letters patent, is the projection on the forward side of the cantle above its lower edge in the manner and for the purpose above described."

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23. For *Improvements in the Steam Engine;* William A. Lighthall, Albany, New York, April 11.

Claim.—" In the foregoing specification, I claim as my improvement in the steam engine,—First, the arrangement and disposition of the steam chests, side pipes, condenser, exhaust pipe, bed plate and air pump in combination with the cylinder lying horizontal upon the solid keelson or frame, said cylinder being in the hold of the vessel, below the deck beams. Second, the mode of working the valves whole and half stroke, by the combination of the eccentric wheel, eccentric hook and branch hook, the heart cam and cam hook, together with the hollow rock shaft, substantially as described, in combination with the cylinder in the aforesaid horizontal position."

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24. For an *Improvement in the Water Wheel;* William Lamb, Whitestown, New York, April 11.

Claim.—" What I claim as my invention, and desire to secure by letters patent, is the construction of water wheels designed to run

under water, with one, two, or more floats so placed in relation to the shaft and body of the wheel as to form a short transverse section of a screw of one, two, or more threads respectively—to be made of any suitable material, and of a shape that may be moulded and cast whole, or to be made of wood, or part of each—in combination with a coiled or scroll trunk, so made as to bring the water in contact with one side of the wheel, and conduct it around the wheel in the direction the wheel runs (except what is discharged in its passage) the trunk being diminished in size gradually by drawing in the side or sides, or by gradually raising the bottom, or both, so that the size of the trunk at any given point, shall be adapted to the quantity of water remaining undischarged at that point, in its passage around the wheel under the floats; said trunk to be made of metal or wood, or part of each, and of a size and form best adapted to the circumstances."

25. For *Improvements in the Apparatus for the Resuscitation of Persons from Suspended Animation;* Edward Welchman, Cold Spring, New York, April 11.

The patentee says,—"The above resuscitating apparatus consists of a double bellows, placed one above the other, the inferior one is for the purpose of inflating the lungs, the superior one for withdrawing the air previously introduced, thereby preparing the lungs for another inflation. Both of the bellows are filled at the same time, and by the same movement; the inferior one with atmospheric or other air, the superior one with air from the lungs. Both are discharged at the same time, and by the same movement."

Claim.—"I do not claim as my invention, the use of a pair of bellows for inflating the lungs, but the combination of the two bellows; one for the purpose of inflating the lungs, and the other for extracting the same; and also the further combination of them with an apparatus for warming the air or airs introduced into the lungs.

"I do not claim the materials of which the apparatus is constructed as new, as they may be made of various materials, but the mode or manner of their arrangement."

(To be continued.)

FRANKLIN INSTITUTE.

Sixteenth Exhibition of American Manufactures, held in the city of Philadelphia, from the 20th to the 31st of October, inclusive, 1846, by the Franklin Institute of the State of Pennsylvania, for the promotion of the Mechanic Arts.

Address by Owen Evans, Esq.,

Chairman of the Committee on Exhibitions. Delivered on announcing the Premiums awarded.

Ladies and Gentlemen.—With this evening closes the Sixteenth Exhibition of American Manufactures, held by the Franklin Institute.

We were desirous of presenting to you at this time, the report of the Committee on Exhibitions, but the reports of the judges in many departments, came in at so late an hour, that it was found impossible to collate them in a proper manner, to be read this evening. We will therefore only announce the premiums.

The very able address by Mr. Roberts last evening, embraced so much strong argument to prove the importance of the mechanic arts, that I shall say but little, and perhaps had better say nothing.

Much doubt has obtained in regard to the policy of holding an annual display of the product of American skill. It was thought by some that the manufacturers would tire of being appealed to so frequently as once a year, and that the exhibitions possess so much apparent monotony that they would lose their interest with the public, by being held too often.

If the holding of these exhibitions was merely a money making scheme, it would be proper to consider these things, and either open them only when they would probably prove profitable, or call in some other attractions to bring an influx of visiters; but the Franklin Institute of the State of Pennsylvania, was chartered for the promotion of the Mechanic Arts, and its purpose in holding the exhibitions is to furnish a view of the progress of the Mechanic Arts from year to year; to effect that object it opens these rooms every autumn, and admits nothing which does not legitimately come within its jurisdiction.

Notwithstanding the heavy call that was made on the manufacturers for the exhibition at Washington last summer, and the holding of another in New York of the same kind, at the same time that we were open, a walk through these rooms will prove that the object of the Institute is appreciated by the manufacturers.

Those who hold that the condition of the manufactures of a country is an index to its prosperity and freedom—that its resources are the pillars of its greatness, cannot fail to admit when they compare previous exhibitions with the present, and with manufactures abroad, that we not only occupy a proud position among nations, but that we are constantly and rapidly increasing in importance, in independence, and in fame. If we admit that the Arts have value, such an argument must prevail, because we cannot fix their boundary. We may speed or retard their growth, but when once introduced into a country like ours, it would be difficult to drive them out, even if it were desirable. It is true that fruits and roots will sustain life, a cave will shelter us from the inclemency of the seasons—and there is room yet in this country for those who fancy such a mode of living.

We desire to thank the manufacturers who have sent their wares —the gentlemen who assisted us in the arrangement of the exhibition and those who served as judges—a vast deal of labor was required and it has been freely furnished. While we acknowledge our obligations to the gentlemen who have assisted us, we own ourselves much indebted to the ladies. In regard to our company, we are fully conscious of the probability that very few gentlemen would visit us if no ladies were to be present. Last year we called upon their judgment officially, and then only in one department. Whether their de-

liberations were of value or not, is perhaps best answered by the fact, that we this year solicited and obtained their assistance on two committees of judges.

In submitting the award of the Committee on Exhibitions, it is proper to say that, by a rule of the Institute, the report of the judges cannot be altered without giving notice to the chairman of the Committee of Judges, whose report it is designed to modify. The general rules governing the committee, and the duties assumed by it were elaborately and distinctly explained by the chairman of the last exhibition in his address, and we deem it unnecessary to repeat them now.

We cannot do more this evening than simply announce the awards. Articles that are equal to what have received premiums at former exhibitions, and all goods that have received favorable notice by the judges—and these comprise a very long list, will be noticed properly in the general report. Depositors are requested to exercise patience, until the report is published which will be in a very few days.

It is a source of regret to the committee that so many meritorious articles came in too late for competition. The number of this class this year is unusually large. Some of the judges remarked when returning their reports that their catalogue of the articles entered in time for competition was very meagre, while the display in quality and quantity greatly exceeded that of any previous exhibitions. The rules and regulations for the government of the exhibition were extensively published through the newspapers and by circulars more than three months before opening, and every facility was afforded by the committee for the public to become familiar with them. To set the rules aside would cause such serious confusion that very few, aware of its extent, would be willing to encounter it.

Report of the Committee on Exhibitions.

The Sixteenth Exhibition of American Manufactures, held under the direction of this Committee by the Franklin Institute, has been brought to a close ; and it is now proper that the committee should present a report concerning the manner in which the duties confided to them by the Institute have been discharged.

Notwithstanding the general publicity which was given by advertisements and circulars, with regard to the time of receiving goods for exhibition, the delay on the part of depositors was this year unusually great. The time limited for receiving goods for competition, expired at 10 o'clock on the morning of Tuesday, October 20th, at which time our tables were little more than half covered with goods, and the judges' lists, made up to that moment, included only the articles then actually in the rooms. The rule was rigidly enforced, though the doors were then thronged by a crowd of depositors, who, during Friday, Saturday, and Monday, had neglected to bring their goods, but were now, at the last moment, eagerly pressing forward, and clamorously demanding an entry on our books before the 10 o'clock line was drawn. Some of the most commendable articles in

the exhibition were thus brought too late for insertion on the lists furnished to the judges; and many depositors were thus deprived, by their own negligence, from receiving a merited award. To this delay of depositors may also be ascribed the cause why the premiums awarded this year are smaller in number than at the last exhibition.

The removal, since our last exhibition, of the Philadelphia Museum collection, with the cases in which it was contained, from the upper saloon and galleries, greatly extended the space to be occupied by us, and added about one-third to the capacity of our tables. This removal of the museum, and consequent extension of area, produced an impression on the first opening of the exhibition, that the collection of goods was much smaller in quantity than that of last year; but the entries on our books show a considerable increase in many of the departments, and towards the close of the first week, when the deposits were generally in, the total collection was not inferior, in extent or interest, to that of any former year.

In making our awards, and in our notices of the several articles deposited, we have been governed by the reports of the judges appointed to examine them. If injustice has been done to any depositor, or if any article which was brought *in time* has failed to receive due notice; the error must be ascribed to accidental or unavoidable omission, and not to intentional neglect. Where so vast an amount of labor as we have had to perform, falls upon so small a number as have this year taken an active or efficient part; it is not possible for human diligence and attention to prevent error, or omission, in particular cases.

The following general abstract is compiled from the reports of the judges in the several departments:

I.—*Cotton Goods.*

The display of cotton goods is much inferior, both in quantity and variety to that at the last exhibition. The judges report that the printed cottons give no evidence of any improvement, either in style or quality; and are decidedly inferior to those of last year. In the cotton fringe, checks, canton flannels, cotton yarns, Manchester ginghams, and cotton warp, they perceive no improvement whatever. The colored spools, made by J. L. & S. Shreve, though brought in too late for competition, deserve high commendation for style, color, strength, and finish. A case of goods from James' steam mill was also too late, but as far as the judges could determine by looking through the glass, (the case being fastened,) they appear to maintain their general character for superiority of style and fineness.

II.—*Woolen Goods*

No. 20, embroidered woolen shawls, made by Duncan & Cunningham, Belleville, N. J.,—No. 16, scarlet, blue and green blankets, by the Gonic Manufacturing Co., Rochester, Mass.,—No. 46, embossed table and piano covers, by Duncan & Cunningham, Belleville, N. J., —No. 43, superfine black cloths, by W. & D. D. Farnum, Waterford, Mass., all deposited by David S. Brown & Co. The judges speak of

these goods in terms of high commendation, but do not consider them superior to the same description of goods for which the first premium has been awarded to their respective makers at former exhibitions.

No. 19, fancy cassimeres, by the New England Co., deposited by D. S. Brown & Co., for superior make and finish, are entitled to a Second Premium.

Nos. 26, 26½, plain black and figured cassimeres, by Wethered & Bro. of Maryland, deposited by W. R. Hanson & Bro. These goods, for their superior style and finish, are considered worthy of a Second Premium.

No. 50, black cloths, by S. Slater & Sons, Newburyport, Mass., deposited by W. R. Hanson & Bro. The piece-dyed specimens are regarded as a good article, and fully deserve a Second Premium.

No. 42, green cloths, by W. & D. D. Farnum, Waterford, Mass., deposited by D. S. Brown & Co., are of good make and color. A Second Premium.

The judges also notice with praise Nos. 44 and 45, fancy and striped cassimeres, by W. & D. D. Farnum, Waterford, Mass., and No. 41, plaid cassimeres, from the Union Woolen Co., Providence, R. I., deposited by David S. Brown & Co.

III.—*Carpets and Oil Cloths.*

After a careful examination of the goods deposited in this department, the judges report that though the articles are generally creditable, they do not conceive themselves authorized to recommend any premium. They remark that the two pieces of oil cloth, No. 363, by A. M'Callum & Co., are specimens of excellent manufacture.

IV.—*Silk Goods and Gloves.*

No. 21, eleven pieces silk vesting, made by Campbell & Bro., Philadelphia. The judges consider these specimens of American manufacture equal to any imported, containing the same quantity of silk per yard, and worthy of a Second Premium.

No. 953, an invoice of silk goods, by J. S. Whitney, Philadelphia, are considered as superior articles of the kind. The silk suspenders are mentioned by the judges as being the best they have ever seen of American manufacture, and deserving of a Third Premium.

No. 956, kid gloves, by G. R. Corry, Philadelphia. These are judged to be the best of American manufacture that have yet been exhibited, and fully equal to any imported. Their softness, beauty of stitch, and general appearance are highly commended, and they are considered as meriting a First Premium.

No. 959, a case of gloves by J. R. Ashford, Philadelphia, are considered as a superior article, and entitled to a Second Premium.

The following articles are mentioned by the judges as entitled to creditable notice: No. 30, sewing silk, spool silk, and silk hose, by Miss A. E. Storer. No. 31, cleansed and restored kid gloves, by J. A. Miller & Co. No. 974, kid gloves, by Wm. Hawkins; and No. 989, buck gloves, by A. Cheapdell.

V.—*Iron and Steel.*

This interesting department of the exhibition was well filled with specimens, and the committee were gratified to observe the progress of this important branch of the productive industry of Pennsylvania so amply illustrated by a great variety of specimens from different parts of the state. The following is an abstract of the report of the judges, and the premiums recommended by them are awarded by the Committee on Exhibitions.

No. 1661, a lot of rolled iron, of assorted sizes, round, square and band iron, made by Smith, Thomas, and Ogden, at the Fair Mount Rolling Mill, Philadelphia, and deposited by Morris & Jones. This iron is so well rolled, and the quality so good throughout the lot, that it is judged worthy of a First Premium.

No 1513, fifteen bars of hammered iron, made at Weymouth, N. J., by Colwell & Co. This iron is well hammered, of very good quality, and more uniform than usual. It is stamped, as all bar iron ought to be, with the maker's name. To it is awarded a Second Premium.

No. 1590, nine bars of hammered iron, made by James Sproul, deposited by W. L. Potts & Son. They are unequal in quality—some of them very good, and others inferior. The maker's name is not stamped.

No. 1524, nine bundles of slit rods, made by Valentine & Thomas, deposited by Isaac Miller. These are of good quality and very similar to those exhibited on former occasions.

No. 1661, plates of boiler iron, made by Forsyth & Co., of Chester Co., deposited by Morris & Jones, are of the good quality usually exhibited by them.

No. 1518, one bar of rail-road iron of the H pattern, deposited by Thomas Hunt. This appears to be made of good iron; but is not so smoothly rolled as some specimens exhibited by others last year. A little more experience on the part of the manufacturer may obviate this objection.

No. 1691, two flat bars of rail-road iron, with countersunk holes, made by Robbins & Verree, Kensington, are good bars, and well rolled.

No. 1710, five bars of heavy rail-road iron, varieties of the H pattern, rolled by P. Cooper at Trenton, N. J., some of them intended and made for the Camden and Amboy R. R. Co. These specimens are highly creditable, and had they been deposited by the prescribed time, would have received a first premium.

No. 1691, a bundle of spring steel, by Robbins & Verree, Kensington, is a fair article.

No. 1513, six samples of foundry pig iron, from Maria, Carbon, and Red Point furnaces; some made with charcoal and some with anthracite. These are deposited by Colwell & Co., and all appear to be good.

No. 1554, two samples of pig iron, made with anthracite coal, at Henry Clay Furnace, near Reading, Pennsylvania, deposited by Curtis & Hand. A good article.

No. 1620, pig iron, from J.V.R. Hunter, of Sally Ann Furnace, Berks Co., Pennsylvania, and No. 1621, pig iron from P. A. & S. Small, of Ashland Furnace, York Co., Pennsylvania, look very well. A small specimen of pig iron, from the Harrisburg Furnace, by Governor Porter, is of excellent quality. A lot of good pig iron, deposited by Morris and Jones, is not marked with the maker's name;—and some other specimens came in so late as not to be put upon the judges' list.

The committee are gratified with the display of iron castings generally, but regret the absence of hollow ware, which ought to have been exhibited. In some instances they cannot judge with certainty as to the degree of credit due to different individuals, as castings are sometimes deposited in the name of the fitter, and that of the founder is not given.

No. 1574, a lot of vases, chairs, settees, and umbrella stands of cast-iron, by Morris, Tasker & Morris, Philadelphia. The designs are good, and the execution shows a laudable desire to improve in this important branch of manufacture, in which the makers show a highly praiseworthy progress. They deserve a Second Premium.

No. 1663, articles of cast-iron, by Jordan L. Mott, of New York, deposited by Williams & Hinds. The iron stands for school-desks, and seats with backs for scholars, are neat and cheap, and worthy the attention of school directors. The iron revolving chairs are well contrived, and the design for garden vases is good. The bathing tub of cast iron is an excellent article. To this lot of castings we award a Second Premium.

The attention of the judges on iron and steel has been called to the *cast iron stoves;* as specimens of the progress now being made in the art of casting. They are of the opinion that many of the specimens deposited deserve great praise as castings; and that those by Atwood, Cole & Crane of Troy, N. Y., and those by W. P. Cresson of Philadelphia, are worthy of First Premiums for the *casting*, if they should not receive a similar award as *stoves* by the judges of stoves.

No. 1608, cast iron fronts for fire places, deposited by Weaver & Volkmar, are beautiful.

No. 1592, specimens of iron railing for cemetery lots, by Robert Wood, Philadelphia. The design and workmanship deserve praise; but the top is not in good taste. The garden settees of cast iron deposited by him are very good.

No. 1647, a case of sheet iron, made in imitation of the Russian, by James Wood & Son, accompanied by stove work made of the article. This manufacture maintains the high character for which it received a first premium on a former occasion.

Two pieces of sheet iron, *said to be made in imitation of the Russian*, were deposited by Joseph Richards. The judges were unable to distinguish them from the foreign article, and on calling upon the depositor for proof that they were of American manufacture, he declined giving any. The sheets of iron were immediately removed from the exhibition by the judges; and they feel that they would be wanting in their duty, if they did not characterize this conduct on the part of the depositor as highly reprehensible. By the regulations of

our exhibition, the judges have a right to call for proofs of origin whenever they have any doubts on the subject. The design and object of these exhibitions is the promotion of home industry, and it is a high offence against propriety for a depositor to bring into them any article which he is not prepared to prove to be of American Manufacture.

VI.—*Umbrellas.*

No. 28, a case of umbrella handles, made by J. Schwartz, Philadelphia, of good taste and beautiful workmanship. They merit a Third Premium.

No. 32, parasols and umbrellas, by William A. Drown, made entirely of materials of Philadelphia manufacture, and fully equal to those for which the maker received a first premium at the last exhibition.

No. 37, umbrellas and parasols, by Asch & Pincus, made entirely of materials manufactured in Philadelphia. The parasols are remarkable for the extreme neatness of the sewing, and the goods are made in a style worthy of the deserved reputation of these manufacturers, who received a medal at the last exhibition.

VII.—*Lamps and Gas Fixtures.*

The display of articles in this line is highly creditable to the manufacturers. After a careful examination by the judges, they recommend, and the committee award, the following premiums.

To No. 1287, three chandeliers in *or molu* by Cornelius & Co., Philadelphia, believed to surpass any before exhibited in beauty of finish, is recommended a special premium of the *Gold Medal*, with the consent of the Institute.

No. 1315, a silver plated gas chandelier, by E. Whelan, Philadelphia, a First Premium.

No. 1261, gas burners, by Charles Gefroerer, Philadelphia, a Third Premium.

No. 1262, gas burners, by Joseph Saul, Holmesburg, Pennsylvania, a Third Premium.

No. 1214, lard lamps, made by John W. Henry, Philadelphia, a Third Premium.

No. 1302, pine oil lamps, by M. B. Dyott, Philadelphia a Third Premium.

No. 1294, embossed paper lamp shades, by C. Y. Haines, Philadelphia, a Third Premium.

VIII.—*Hardware and Cutlery.*

This department, as usual, is one of the finest in the exhibition, and exhibits a highly gratifying view of the continued improvement made by our enterprising manufacturers in this important branch of domestic industry and skill. Great credit is due to the Committee of Arrangement in this division of the exhibition, for their zeal, and the

good taste displayed by them in the arrangement of the articles. The judges, after a careful examination of the great variety of specimens submitted to them, report as follows:

No. 608, a case of mill saws, by Wm. Rowland, Philadelphia, These saws were carefully compared with other very excellent articles of the same description, and for their evenness and excellence of finish they are believed to be the best exhibited, and worthy of a First Premium.

No. 613, mill, circular, and hand saws, by Paul & Hicks, deposited by Cresson and Fisher, Philadelphia. These articles were critically examined and compared with the last mentioned, and though in some respects the large saws were not quite equal to the former, yet the good workmanship and general excellence of the whole fully entitle the makers to the award of a First Premium.

No. 629, chisels, hatchets, and other edge tools, by John C. Beatty, Springfield, Delaware Co., Pennsylvania. These goods rank among the very best of their description, and for general excellence of workmanship and very superior finish, merit the award of a First Premium.

No. 631, edge tools, chisels, hatchets, &c., by John Beatty, Springfield, Delaware Co., Pennsylvania, deposited by Thompson, Carr, & Co. These goods were elaborately examined by the judges, who recommend for good workmanship and excellent finish, a First Premium.

No. 665, wire rope, by John A. Roebling, Pittsburg, Pennsylvania. The excellent make of this article affords the Committee much satisfaction in its examination. As it is the application of iron to a comparatively new purpose, and is beautifully made, the judges and the committee award to the manufacturer a First Premium.

No. 713, four cards of bolts, by F. J Stanley, New Britain, Conn., deposited by Heaton & Denckla. These appear to be, in all respects, substantial, neatly made, and well finished. The judges esteem them as surpassing in excellence anything of the kind heretofore deposited in our exhibitions, and fully entitled to the award of a First Premium.

No. 722, samples of locks, made and deposited by Morgan & Abell, Springfield, Mass. These locks are of simple contrivance and appear to possess all the elements of durability; they are also remarkably well made and finished. To the makers is adjudged a First Premium.

No. 611, a case of guns, by John Krider, Philadelphia. These guns, for good taste, workmanship, and finish, are believed to be the best ever exhibited, and entitled to a First Premium.

No. 616, watchmakers' tools, by L. Fabier, Lewisville, Ohio, deposited by L. R. Sowers, Philadelphia. Some of these articles are a close imitation of the best description of similar Lancashire goods; and it is believed that a little more practice will enable the manufacturer to compete successfully with the foreign article. For their general excellence they are deserving of a Second Premium.

No. 699, rifles, by E. K. Tryon, Philadelphia. These are very creditable goods, especially a specimen of rifles, made for the U. S. government. This sample is substantially and neatly made, and finished in excellent taste. These qualities, in connexion with the price at which they are furnished, entitle the maker to a

Second Premium.

No. 602, curry combs, by Wm. Wheeler & Co. Troy, N. Y., deposited by Price, Newlin & Co. A well made and serviceable article, worthy of a Third Premium.

No. 620, stocks and dies, by B. Martins, Philadelphia. Well made goods, designed and finished more for use than show, and highly creditable to the maker. They merit a Third Premium.

No. 637, Britannia spoons, by Foote & Co., Wallingford, Conn. Very creditable to the makers, and worthy of a Third Premium.

No. 640, shovels and tongs, by J. B. Byrne & Co., Trenton, N. J., deposited by Thompson, Carr & Co. A fair merchantable article for ordinary use, to which we award a Third Premium.

No. 680, axes, by Wm. Mann, Lewistown, Pennsylvania, deposited by Martin Buehler & Bro. These are beautifully made, and will compare advantageously with similar goods by our best manufacturers. They merit a Third Premium.

No. 703, a lot of planes, by Geo. Burnham jr., Amherst, Mass., deposited by Heaton & Denckla. These are in every respect the best made articles of the kind in the exhibition, and are furnished with irons of American make. They are not, however, superior either in make or finish to similar articles formerly exhibited. We award them a Third Premium.

No. 704, scythes, by Inman & Co., Smithfield, Slatersville, R. I., deposited by Heaton & Denckla. An excellent article, well ground and finished, and entitled to a Third Premium.

No. 630, butt hinges, by Roy & Co., Watervliet, N. Y., deposited by Thompson, Carr & Co. The excellence of these articles fully sustains the just reputation of the makers; they are fully equal in every respect to those for which their manufacturers received a first premium at a former exhibition.

No. 657, planes, by Colton & Sheneman, Philadelphia, well made, but not quite equal in finish to similar articles formerly exhibited.

No. 658, screw wrenches, by S. Merrick, Springfield, Mass., deposited by G. H. Whitaker. A well made, substantial article, fully equal to any exhibited by the makers on former occasions.

No. 659, files, by Geo. Machin, Phila., worthy of the credit acquired by the maker at former exhibitions.

No. 666, wood screws, by the New England Screw Co., Providence, R. I., deposited by Curtis & Hand. These specimens are fully equal to those for which the makers have heretofore obtained the First Premium.

No. 991, Gilt buttons, by Wadhams & Co., Wolcottville, Conn., deposited by S. Byerly & Co. The makers of these articles received a premium on a former occasion, and the excellence of their present samples fully sustains their reputation.

The following articles are noticed by the judges in terms of commendation, and as deserving of attention.

No. 605, patent balances by David T. Stewart, Phila. 607, sash locks, by James Jones, Rochester, N. Y., deposited by Dilworth & Branson. 621, shovels, by T. C. Wood, Phila.: 632, scythe stones by F. & H. Keyes, Newbury, Vt., deposited by Steinmetz & Justice. 643, Britannia ware, by Hall, Boardman & Co., Phila.: These goods, are well finished; but the judges think would give greater satisfaction if more attention were paid to gracefulness of form. 646, shoemaker's awls, by Tho. Hall, Phila.: A fair article; but a better finish would add to the reputation of the maker. 647, shovels, by John Richards & Son, Phila. 650, brass goods, by F. Jordan, Phila., creditable; but will admit of better finish. 654, hammers, by B. Richardson & Son, Phila. 660, hoes, by Jacob Souder, Phila. 668, shoe knives, by John Ames, Mass., deposited by Curtis & Hand; worthy of special notice. 669, cast iron parallel vices, by Charles Parker, Meriden, Conn., deposited by Curtis & Hand. A substantial, well made article, highly approved. 672, planes, by E. W. Carpenter, Lancaster, Penna. 679, augers, by Thomas Slack, Chester Co., Penna., deposited by Martin Buehler & Bro. 682½, locks, by Joseph Nock, Phila. 683, shutter hinges, by Charles Parker, Meriden, Conn., deposited by Dilworth & Branson. 684, hand saws, by Bringhurst & Kirby, Germantown, Penna. 688, planes, by John Colton, Phila. 701, butcher and shoe knives, by J. Russell & Co., Greenfield, Mass., deposited by Heaton & Denckla. 702, hand cards for cotton and wool, by W. Whittemore, Boston, Mass., deposited by Heaton & Denckla. 705, butt hinges, by the New England Butt Co., Providence, R. I. 707, table knives and forks, by Geo. Bartholomew, Bristol, R. I., both deposited by Heaton & Denckla. 368, a cross bolt lock and knobs, by James F. Bradford, Phila., of very good workmanship.

No. 670, cast iron parallel vices, by Fisher & Martin, Newport, Maine, deposited by Curtis & Hand. These are a substantial, well made article. As the principal merit claimed for them is the mode of uniting the steel to the cast iron, and the adjustment of the jaws, the maker is recommended to apply for an investigation by the Committee of the Institute on Science and the Arts.

As usual, many excellent articles were brought too late for entry on the lists furnished to the judges. Among these may be mentioned No. 740, samples of locks manufactured in Charleston, S. C., by George Oates. 737, excellent locks, by Littlefield: and No. 1716, a stand of hoes, pitchforks and other agricultural implements, by E. & T. Fairbanks, deposited by D. O. Prouty, the finest exhibited, and worthy of the highest approbation.

IX.—*Saddlery, Harness, and Trunks.*

The judges appointed to examine this department of the exhibition recommend the following awards.

No. 374, two sets fine coach harness, by Lacy & Phillips, Phila. These sets differ from each other in style, but are of equal excellence in workmanship; presenting specimens of the highest order of skill

and taste on the part of the makers. They are deserving of a First Premium.

No. 367, a set of single harness, by Mahlon Warne, Phila. This is highly commended by the judges for good workmanship, and merits a Second Premium.

No. 349, two trunks, by John Unruh, Phila. Both excellent articles, and highly creditable to the maker. For the russet trunk we award a First Premium.

No. 354, a russet trunk, by Thomas W. Mattson, Phila., is considered as well deserving a Second Premium.

No. 380, valise trunk, by Jacob Moyer, Phila., a Second Premium.

No. 365, a trunk, by W. P. Taylor, appears to be an excellent article; but being fastened, the judges were prevented from examining the interior. Other trunks were exhibited under similar circumstances.

No. 342, fly nets, by Aug. Miller, Phila. No. 370, a saddle, by M. J. Lukens. No. 382, saddles, by Wm. Moyer, are mentioned as articles of creditable workmanship.

X.—*Models and Machinery.*

The number and variety of articles in this important branch of the exhibition is superior to what has been seen in past years; but is still inferior to what it should or might be, in a city which may be termed the very seat of the mechanic arts. The display of working machinery exceeds that of several former exhibitions, and is thus far a subject of congratulation. We would, however, earnestly urge early and active attention on the part of the committee having charge of this department in future exhibitions; as it is one of the most interesting to visiters, and important to the community.

The following abstract is presented from the report of the judges on this branch.

No. 1501, A coal screen, by J. B. Wickersham, Philadelphia. An exceedingly well made article, which merits particular commendation, and to which we adjudge a Second Premium.

Nos. 1511, 1523, and 1693, hydraulic rams, by H. P. M. Birkinbine & C. Farnham of Philadelphia, and B. S. Benson of Baltimore. The rams of Birkinbine and Benson were kept in operation in the lower room, and played an important part in the exhibition; to all appearance working effectually and satisfactorily. In Benson's arrangement means are afforded for throwing up spring, or other water than that which gives the lifting power; the operation of which was satisfactorily exhibited. This mode is claimed by him, and is an important modification where pure water is required. The judges had not the means, in the room, of testing the relative merit of these machines, and are consequently unable to make an award of premiums. They therefore recommend that the makers submit these articles to a special examination by the Committee of the Institute on Science and the Arts, in order to test the power and comparative merits of these useful contrivances for raising water.

No. 1512, machine for shaving stereotype plates, by C. H. Brightly, Philadelphia, well contrived, neatly made, and worthy of a Third Premium.

No. 1514, bricks burnt with anthracite coal, by J. W. Andrews, Norristown. Compact, well burnt, and of superior appearance; affording another evidence of the important employment of the great Pennsylvania staple in the useful arts. They deserve a Second Premium.

No. 1515, a copying press, by Charles Evans, Philadelphia, worthy of the well known reputation of the manufacturer.

No. 1527, a car coupling, by S. K. Sweetman, Philadelphia, which appears to have considerable merit. The judges recommend an application to the Committee on Science and the Arts for an examination.

Nos. 1529, 1530, 1531, portable mills, by Charles Ross, New York, deposited by Charles Greene, Philadelphia. These articles received favorable notice and a premium at the last exhibition; being highly approved for pioneer and emigrant uses in a new country. Several improvements having been made in these useful machines, we award, for said improvements, a Third Premium.

No. 1532, a cast iron mill for crushing and grinding corn and cobs, by J. P. Ross, Lewisburg, Union county, Pennsylvania. For this useful and important agricultural implement, which may be easily worked by horse power, we award a Second Premium.

No. 1537, power loom, by the Gloucester Machine Company. A well finished and effective article, which was kept in operation during the exhibition, a First Premium.

No. 1539, diaphragm water filters, by W. H. Jennison, New York, were sufficiently well noticed last year.

No. 1541, platform scales, by Ellicott & Abbot, Philadelphia. One of these is finished in remarkably neat style, and all appear to be well constructed and worthy of commendation.

No. 1544, carpenter's tool chest, by Thomas Little, a journeyman house carpenter. A very neat, pretty, and convenient article, deserving a Third Premium.

No, 1546, weavers' shuttles, by Isaac Senneff, Philadelphia, well made and finished, entitling the manufacturer to a Third Premium.

No. 1549, a machine for covering buttons, by Alonzo Isbell, Philadelphia. This machine was kept in operation at intervals during the exhibition, and excited much attention on account of the quiet and mysterious celerity with which it puts together the parts of covered buttons. It is judged worthy of a Second Premium.

No. 1550, Dr. Ross' exercising swing, made by G. W. Porter & Co., Philadelphia. This article was last year recommended to the Committee on Science and the Arts. The judges, in evidence of their confidence in its utility and safety, now recommend a Third Premium.

Nos. 1558 to 1565, a lot of agricultural implements deposited by D. O. Prouty, Philadelphia, consisting of grain fan, corn shellers, straw cutter, sausage meat cutter, hand grindstone, and ploughs. These all appear to be excellent articles, well adapted to the various purposes for which they are intended. To the grain fan, patent of J.

T. Grant & Co., Scaghticoke, New York, the judges award a Third Premium. The sausage cutter, so far as they can judge by inspection, will do its work well, on which ground they recommend for it a Third Premium.

No. 1566, fire bricks, by Edward David, Trenton, New Jersey. The exhibitor desires to have these bricks tried; but it is well known that no trial can be made, with a result to be relied upon, with less than a quantity sufficient for a furnace; in which case only can their comparative merit be ascertained.

No. 1585, an "improved" cast iron water wheel, by Wm. Dripps, Coatesville, Pennsylvania; and No. 1594, model of an anthracite furnace, by C. Custer, Perry County, Pennsylvania, an application is recommended to be made to the Committee on Science and the Arts for examination.

No. 1606, an ingrain carpet machine, by John Scott, Philadelphia, is the best for workmanship which has fallen under the notice of the judges, who recommend for it a Third Premium.

No. 1607, a coverlet machine, by James Scott, Philadelphia. Worthy of the same notice as the last mentioned article, and deserving a Third Premium.

No. 1613, weavers' shuttles, by Ellis Jackson, Philadelphia, a Third Premium.

No. 1635, a patent blower, by J. Kisterbock, (Dimpfel's patent) of good construction, to which is awarded a Third Premium.

No. 1645, platform and counter scales, by E. & T. Fairbanks, Vermont, deposited by A. B. Norris, which sustain the deserved reputation of the makers.

No. 1657, Turbine water wheel, by H. Munger, Massachusetts. Application is recommended to be made to the Committee on Science and the Arts for examination.

No. 1670, a smut machine, by Leech Tyson, Philadelphia. A similar application is advised.

No. 1672, rolling pivot blinds, by John Bower, Philadelphia, are very creditable specimens of workmanship, and merit a Third Premium.

No. 1673, axletrees, by J. H. Amer, Philadelphia, well made, and worthy of a Third Premium.

No. 1674, a mortising machine, by J. Cubbison, Philadelphia, for the chisels of which is adjudged a Third Premium.

No. 1631, model of a steam engine, by C. F. Carpenter, Chester county, Pennsylvania. This very neat and delicately constructed model is highly spoken of by the judges, as being of better proportions and execution than is usual in models. It merits a Third Premium.

No. ——, the horizontal steam engine made by William Smith of Philadelphia, which was used to supply motive power for the various machines in operation during the exhibition, has proved very efficient and serviceable. It is neat in form, well proportioned, and exhibits good workmanship on the part of the maker. The judges recommend to him the award of a Second Premium; and the thanks of the

committee are due to the maker for his kindness in giving them the use of the engine.

No. 1553, models of trellis railway track, patented by James Herron, Civil Engineer, Philadelphia, and deposited by him. These models are very neatly made. They represent modifications of Mr. Herron's plans for constructing the superstructure of railways, which have been found in practice to work well, and which have been favorably reported upon by the Committee of the Institute on Science and the Arts several years since.

For an examination and report on the improvements in these tracks an application to the Committee on Science and the Arts is recommended.

A great number of articles were deposited after 10 o'clock on Tuesday, and were in consequence too late to be placed on the list furnished to the judges.

Among these is a neat and well made drilling machine, by Marshall & Teal, which would have received a premium if deposited in time. A portable forge, by C. H. Brightly, merits commendation. Welded gas pipes, by Morris, Tasker & Morris sustain the deserved reputation of the makers; and samples of the same article by S. Griffiths also deserve commendation. No. 1709, a card press by S. B. Ruggles, deposited by S. P. Seaman, the maker is recommended to apply for an examination by the Committee on Science and the Arts.

No. 1698, cast iron roofing, by William Beach, Philadelphia. This roof presents a neat appearance, and the casting is creditable. The article is deserving of attention, and should be effectually tried, by which alone the merit of the form and structure can be proved. Of the efficiency of the material there can be no doubt. Had this article been deposited in time it would have received a premium.

No.—a fillet card machine, by James Smith & Co., Philadelphia. This machine was occasionally in operation during the exhibition, performing its complex, manifold, and extraordinary motions with beautiful regularity and certainty. The filleting made by it is regularly stuck, and the wire teeth evenly cut. The machine is well made, compact, and neat in form, and is recommended to favorable consideration.

No.—, steam hammer, made and deposited by Merrick & Towne, Philadelphia. This highly important machine, by Nasmyth, of which Messrs. M. & T. hold the patent in this country, is of great value to the arts, and cannot be too highly recommended. The makers being both officers of the Institute, are precluded by our regulations from receiving any award; but the judges remark that under other circumstances, our highest premium would but faintly express their estimate of the value of this machine.

XI.—*Stoves and Grates.*

This branch of our exhibition is usually well filled with specimens, and the display this year, in quantity, variety, and excellence, is not inferior to that exhibited on former occasions. After a minute and careful examination, the judges report in substance as follows:

No. 1502, air tight cook-stoves, for coal, with brick ovens, made by R. D. Granger, of Albany, N. Y., deposited by North & Harrison, are judged worthy of a Third Premium.

No. 1503, cook-stove, for coal, by P. P. Stewart, Troy, N. Y., deposited by North & Harrison. This stove received a first premium at the last exhibition.

No. 1504, Parlor cook-stove, by R. D.Granger, Albany, N.Y., deposited by North & Harrison. The judges deem this an improvement on the general form of parlor cook-stoves, and recommend for it a Second Premium.

No. 1519, hot air cook-stove, by F. W. Most, Philadelphia. A plain and excellent article, worthy of commendation.

No. 1520, a boiler, for range, by R. S. R. Andrews, Philadelphia. A good article, of excellent workmanship, for which is recommended a Second Premium.

No. 1521, cooking range, by Julius Fink, Philadelphia, is the same for which he last year received a first premium. Pipes for the circulation of hot water have since been added, which the judges regard as a commendable improvement.

No. 1548, "anti gas oven," by Wm. Butcher, Philadelphia. The judges regard this as the best article of the kind they have ever seen, and recommend a Second Premium.

No. 1551 & 1552, cast and sheet iron radiator stoves, by S. J. Cresswell. Good specimens of workmanship, and entitled to a Third Premium,

No. 1569, Hedenberg's air-tight parlor coal stove; and 1617, Atwood's empire cook, both received premiums at the last exhibition.

Nos. 1575,—6 & 7, stoves by Atwood, Cole, and Crane, Troy, N. Y., deposited by F. P. Wagner, have been noticed by the judges on iron and steel, for the excellence of the castings.

No. 1603, arch radiators, by H. G. Bartle, Philadelphia, are articles of excellent workmanship, worthy of a Third Premium.

No. 1605, cook, radiator, and other stoves, by Foering & Thudium, Philadelphia. For the display and general excellence of these stoves, the Committee award a Second Premium.

No. 1608, stoves, grates, &c., by Weaver & Volkmar, Philadelphia. A fine assortment of useful and well made articles, worthy of a Second Premium.

No. 1609, grates, by Lloyd & Co., Philadelphia. These are said to be "enamelled," but the judges disapprove of the use of such a name when applied to a material having none of the properties of enamel.

No. 1611, tubular cook stove, by Jordan L. Mott, N. Y., deposited by Williams & Hinds, Philadelphia. A similar stove to that which last year received the first premium. Since that time the maker has improved it by the introduction of a brick oven; an improvement which the judges deem worthy of a Third Premium.

No. 1627, a parlor air-tight coal stove, with radiating flues, by by E. Ripley, Troy, N. Y. A durable and excellent stove; worthy of a Third Premium.

No. 1637, air tight cook stove, by Wager & Dater, Troy, N. Y., deposited by J. Kisterbock. Similar to one from the same makers which received a premium last year.

No. 1650, cast iron stoves, by Wm. P. Cresson, Philadelphia. Beautiful castings, and referred to by the judges on iron and steel.

No. 1664½, portable range, with revolving plate, by Jordan L. Mott, N. Y., deposited by Williams & Hinds. This range has the same mode of circulating hot water, as that noticed in No. 1521, and the Committee award to it a Third Premium.

No. 1547, hot air furnace, by Danl. Culver, Hartford, Conn. This furnace is compact, and at the same time presents a large radiating surface.

No. 1636, cook stove, by J. Kisterbock, Philadelphia. This stove received a premium at the last exhibition. It still maintains a favorable rank in the estimation of many who have used it.

No. 1690, cook stove, by P. F. Hagar, Philadelphia. A plain, serviceable, and good stove, which was entered too late, though the maker avers it was brought in time. If in time, the judges deem it worthy of a Third Premium.

The judges notice with approbation, No. 1555, cast iron parlor stoves, by Wager & Dater, Troy, N. Y., and similar articles by Atwood, Cole, and Crane, of the same place; as well as 1618, a fancy air-tight parlor stove, by Ransom, Albany, N. Y.

Good sheet iron radiators, &c., were deposited by Williams & Hinds, J. B. Kohler, and others, too late for competition.

XII.—*Cabinet Ware.*

It is remarkable that in a city so celebrated as Philadelphia for the amount, variety, and excellence of the furniture manufactured within it, so small a quantity should be offered for display at our exhibitions. We have no doubt that there are many establishments in the city, any one of which could furnish from its ware rooms, almost without being missed, an assortment equal in extent to the whole amount of cabinet work deposited in the present exhibition.

The judges in this department recommend the following awards.

Nos. 7 & 9, fancy reed blinds, by Martin Free, Philadelphia, of economical construction, well suited for the use of persons of limited means; a Third Premium.

No. 1220, five window shades, by Charles Duchesne, Philadelphia. These shades are magnificently ornamented; being painted upon a ground which is well and durably prepared, with excellent taste and artistic effect. They are immeasurably superior to any thing of the kind hitherto offered to the public in this country, and are eminently deserving of a First Premium.

No. 1221, fancy chairs, by A. McDonough, Philadelphia. A fine variety of light and well made chairs, all of which are worthy of commendation. To the rattan chairs we award a Third Premium.

No. 1228, three desks, by Amos Palmer, Philadelphia, of appropriate design and beautiful material, are considered worthy of a Third Premium.

No. 1265, a work box, by Joseph Weller, Philadelphia, for excellence of workmanship, deserves a Third Premium.

No. 1276, a Venetian blind, by W. B. Barnes, Philadelphia, is well made in all respects, and tastefully as well as richly got up. For it we cheerfully award a Second Premium.

No. 1286, a very richly ornamented gilt frame, by Jos. D. Williamson, Philadelphia. This article shows excellent workmanship, and merits a Second Premium.

No. 393, Venetian blinds, by B. & J. Williams, Philadelphia, are in excellent taste and perfectly well made. Their makers are entitled to a Second Premium.

No. 910, a centre table, by Albert Lindsay, deposited by Geo. J. Henkel, is very ingeniously contrived for convenient extension as a dining table, or by separation, for two pier tables. For this very ingenious and ornamental piece of furniture, the Committee award a Second Premium.

No. 1246, samples of furniture, by J. & A. Crout, Philadelphia. This furniture, made from various native woods, sustains the high reputation already acquired by the manufacturers. The dressing bureau is specially recommended to notice as a specimen of stained wood, with the award of a Third Premium.

No. 1298, specimens of wire gauze for window shades, by John Waters, neatly ornamented; and No. 1326, specimens of wood, ornamented by a new process invented by Richard Parkin, would have received premiums if they had been deposited in time.

The judges speak in terms of commendation of No. 1232, a well made pedestal of walnut wood, by J. Henkel; and No.—, a sofa table of ailanthus wood.

XIII.—*Musical Instruments.*

No. 619, an eight-keyed flute, by Geo. Catlin, Philadelphia. This instrument presents nothing new; but its quality of tone is so good, that it is deserving of a Third Premium.

No. 1211, flutes, by J. Pfaff, Philadelphia. The finish and tone of these instruments are such as to merit the highest praise. The maker received a first premium last year for similar articles.

No. 1222, a piano, by Geo. Hupmann, Baltimore.—The tone of this piano is very good: the style of its mechanism is old fashioned: it is, however, deserving of a Third Premium.

No. 1242, a violin, by Samuel Phillippe, Easton, Penna. This violin is pronounced by competent judges to be of excellent quality, and will improve with age. This being a new branch of manufacture, and the finish and quality of this instrument so good, the judges recommend the award of a First Premium.

No. 1273, guitars, by C. F. Martin, Nazareth, Penna. These guitars are of surpassing excellence, both as regards tone and workmanship. Imported guitars would suffer in comparison with them. They are considered fully equal to those for which the maker received a first premium at the last exhibition.

No. 1275, two pianos, by J. H. Schomacker & Co., Philadelphia.

No. 1 has a fine, full, and even tone; the mechanism of the keys is very accurate. The contrivance for candlesticks behind or under the music stand is regarded by the judges as ingenious; but they recommend that it should not be used, as it is better to avoid adding any thing to a piano which might cause a jarring or vibration in the instrument. The judges regard these pianos as creditable to the reputation of the makers, and fully equal to those for which they received a first premium last year.

No. 1283, three pianos, by C. Meyer, Philadelphia. These are regarded by the judges as very good instruments; one of them superior to those sent last year by the same maker, for which he received a first premium. On account of this improvement, the committee now award him a First Premium

No. 1295, a case of musical instruments, by Tho. J. Weygandt, Philadelphia. These instruments are very creditable to the maker. Their tone is particularly adapted for an orchestra, being very full and rich. To them is awarded a First Premium.

Several good instruments came in too late, which otherwise would have received premiums. Among these are No. 1317, a valve trumpet, by C. Zoebish & Son, Nazareth, Penna., and No. 1301, a piano, by Thomas Loud.

XIV.—*Glass and Earthenware.*

The judges on glass and earthenware notice that the contributions to this department of the exhibition are more varied than usual, and, except in fine cut glass, the goods are superior of their kind.

No. 609, cut glass, by the Brooklyn Glass Co., deposited by Filley & Walker. The cutting and finish of the flint glass deserves great praise: the material is good, but not equal to some formerly produced by the same makers. The large druggists' jars are very beautiful, and merit the award of a Second Premium.

No. 610, glass bending, by James Mason, Philadelphia, is a new article in our exhibitions, and deserves much praise. We award for it a Third Premium.

No. 612, earthenware, by Bennett & Bros., Birmingham, Penna., deposited by Geo. Hamersly, Philadelphia. The makers received a second premium at our last exhibition; but the present samples show a great improvement over the excellent ware exhibited by them last year. The large water jar is equal to the best ever produced from the English potteries. The makers are entitled to a First Premium.

No. 644, glassware, by Capewell & Bros., Philadelphia. This is chiefly intended for chemical purposes, and is very creditable to the manufacturers.

No. 645, druggists' glassware, by Burgin & Pearsall, Philadelphia. The perfumers' bottles are very good; the other glass a fair article.

No. 677, coated and colored glass, by the Boston and Sandwich Co., deposited by Thomas Hartell. A premium was awarded to the makers for the same description of glass at a former exhibition. The colors are better in these samples; but the improvement appears to be due to the quality of the glass.

No. 691, Green Glass, by Benners, Smith, and Campbell, Philadelphia. These are very superior goods throughout the lot, and merit a Second Premium.

No. 692, a small lot of earthenware, by R. B. Beach, Philadelphia, deposited by E. B. Jackson. A good article,—well finished,—and worthy of a Third Premium.

No. 915, tobacco pipes, by Morgan & Richards, Kensington, a good and well made article, to which we award a Third Premium.

XV.—*Books and Stationery.*

From the notes of the judges in this department, we compile the following awards and remarks.

No. 14, bookbinders tools and dies, by Gaskill & Copper, Philadelphia. These makers are acknowledged leaders in this business, and the present specimens are worthy of their reputation. We award them a Third Premium.

No. 25, law sheep, and plain and sprinkled sheep bookbinding, executed in a superior manner, by Lindsay & Blakiston, Philadelphia. Though such work as this is not fashionable on a lady's centre table, it is of great importance to the student and professional man. It deserves a Third Premium.

Specimens of extra work, by the same binders, are highly commended by the judges.

No. 34, blank books, by Speel & Donohue. The ruling is neat and the work strongly and tastefully executed.

No. 54, velvet binding, by J. B. Lippincott & Co. Executed neatly, in great taste and variety of style,—worthy of a Third Premium.

The judges also notice favorably Nos. 58 and 59, paper from the Southworth Manufacturing Co. They further report that the ink deposited by Harrison last year was tried by one of them, and they embrace this occasion to commend its good qualities as a writing ink.

XVI.—*Paper Hangings.*

The judges report that they notice with pleasure the great improvement in the manufacture of Paper Hangings, and say that they do not hesitate in stating that the specimens made and deposited by Howell & Brothers, of Philadelphia, are considered by them much superior in taste, style, colors, and manufacture, to any ever before exhibited. They particularly notice the specimen of elaborately flowered fresco-paper, as being, for colors and workmanship, unequalled by any thing of the kind ever made in this country. To the manufacturers above mentioned, we cheerfully award a First Premium.

XVII.—*Fine Arts.*

Among the paintings in oil and water colors are several pieces of great merit; but this branch of the fine arts being more dependent upon creative imagination and fine taste, than upon mechanical execution, it seems not to be so closely allied to the leading objects of the Institute, as some other branches of what is usually denominated the

fine arts. These paintings, however, add to the attractions of our exhibitions, and we are willing to award to them all due credit, though on the present occasion no premium is recommended for paintings.

No. 1224, picture of a sleeping child, and two portraits, by G. W. Conarroe. These are beautiful paintings,—life-like and sweetly natural;—worthy of the well established reputation of this well known and skilful artist.

No. 1270, fruit pieces and landscapes in oil and water colors, by A. B. Engstrom. These paintings are well executed and very creditable to the artist :—the fruit is particularly good, and has a most tempting appearance.

No. 1269, landscapes and fruit, by Margaret Parker, a pupil of Engstrom, are well executed and possess considerable merit.

No. 1219, view on the Mediterranean, by Bonfield, is a good painting and deserves notice.

No. 1238, crayon drawings, by Ph. Beaugureau. The execution of these drawings is admirable, showing great skill and exquisite delicacy of touch. They are awarded a Third Premium.

No. 1239, crayon drawings by Ph. Beaugureau jr.,—a lad of 15, son of the last mentioned artist,—are very well done, and give promise of future excellence in this young pupil.

A considerable number of drawings, executed by pupils in the High School, are exhibited, many of which are highly creditable to those by whom they were drawn, and give good evidence of the attention which this useful branch of education receives in that institution.

No. 1226, a map of Germany, from an electrotype plate, by S. Siebert: a perfect copy of the original, which is deposited with it.

No. 1201, engravings, by W. H. Ellis: well executed and creditable to the engraver by whom they were produced.

No. 1257, specimens of medallion ruling, by Asa Spencer. Good specimens of this art.

No. 1268, two plaster busts, by J. Battin, are very good and creditable to the maker.

No. 1217, two specimens of porcelain painting, by M. Strasser, Philadelphia. These paintings are beautifully executed, and the colors well and harmoniously blended,—though the general effect of the work is somewhat impaired by defects in the drawing. The judges recommend the award of a Third Premium.

The display of daguerreotypes is unusually fine; and the establishments of Langenheim, Collins, Simons, Plumbe, Root, Shew, and McClees & Germon, have contributed a great variety of excellent specimens in this branch of art. Of these depositors, Langenheim, and Simons & Collins received a first premium last year; and we consider some of the specimens now deposited by Plumbe, Root, Shew, and McClees & Germon, as being fully equal in merit to those which obtained this premium at the last exhibition ;—but we deem the several collections now deposited so nearly of equal merit that we are unwilling to express a preference by making an award in favor of any depositor.

XVIII.—*Silver Ware and Jewelry.*

The quantity of goods in this department is smaller than has been witnessed at some former exhibitions, and although several of the pieces of plate are very well made, and considerable improvement is noticed in the chasing of several, the judges do not consider the general character of the work superior to that exhibited last year.

No. 642, a lot of silver ware, by W. Wilson, Philadelphia, fully sustains the reputation of the maker, who received a First Premium at the last exhibition.

No. 673, silver ware, by Conrad Bard, Philadelphia. This case contains some plain work equal to any exhibited. The fireman's horn, the plain teapot, and the large bowl are noticed as good samples of hammering, and entitled to a Third Premium.

No. 675, a gold pencil case, by Hopper, Boss & Co., Philadelphia, is considered as a first rate piece of workmanship, with a very ingenious contrivance for introducing leads into the point from the chamber, without any separation of the parts. The judges consider this as a decided improvement on the old plan, and the committee recommend to the maker an application to the Committee on Science and the Arts for an examination of the article.

No. 695, a case of jewelry, by Osborn Conrad, Philadelphia. This work is set with stones cut from Cape May pebbles; the workmanship is very good and highly creditable to the maker.

XIX.—*Marble and Statuary.*

None entered in time for competition.

XX.—*Hats and Caps.*

No. 955, silk hats, by John Hile, Philadelphia. Very superior articles, and deemed worthy of a Third Premium.

No. 987, hats and caps, by Hunt and Getz, Philadelphia. These hats are neatly got up; but in some points of finish are somewhat deficient. A drab beaver hat in this case is thought to be deserving of a Third Premium.

No. 992, hats and caps, by B. Stratton, Philadelphia. A very excellent lot of articles, which merit a Third Premium.

No. 1021, hats, by John Kuhn, Philadelphia. Excellent, and creditable to the maker. Some doubt exists whether these hats were entered in time;—if they were, they are entitled to a Third Premium.

No. 1022, hats, by Sullender and Pascal, Philadelphia. These are regarded as the best exhibited. The material is good; they are well made, and beautifully finished and trimmed. The silk hat, particularly, is faultless. We award a First Premium.

The judges also make favorable mention of articles in this line deposited by John L. Young, E. S. Williams, Samuel Hudson, B. Lightfoot, Francis Bacon, Charles Oakford, E. Kimber, Jr., andothers.

Considerable difficulty and confusion has occurred in this department from the practice of depositors entering their *cases* on our books

in time; while in some instances the *hats* were not deposited until after the opening of the exhibition. The remedy for this will be a rigid adherence to the rule of making no entry on the books, until the goods themselves are actually placed in the rooms.

XXI.—*Combs and Brushes.*

The articles exhibited in this department were generally of excellent character, and the judges report the following as the result of their examinations.

No. 934, combs, by S. Winner, Philadelphia. A beautiful display, of great variety, showing much skill and taste in the execution. A First Premium.

No. 966, brushes, by Abel and Bicknell, Philadelphia. This case comprises an extensive variety of fancy and plain patterns, evincing a high degree of taste and skill. We award to the makers a First Premium.

No. 984, combs, by Charles Flagg: this collection is small, but of excellent workmanship.

No. 920, paint brushes, by E. L. Mintzer, are beautiful and evince a high degree of perfection.

No. 911, brushes, from the Pennsylvania Institution for the Blind. These are considered by the judges as beautiful specimens, and entitled to favorable notice.

XXII.—*Coach Work.*

No. 1556, vehicles by W. Dunlap, Philadelphia. These articles the judges consider as unsurpassed for superior workmanship, elegance of taste, and just proportions. They are fully equal to the work for which the maker received a First Premium last year.

No. 638, elliptic springs, deposited by H. & G. Fricke, Philadelphia. Of superior finish and excellent workmanship. To the maker of these springs, whenever his name shall be disclosed to the committee, they award a First Premium.

No. 1587, Resolution hose carriage, by George Ruhl, Philadelphia. Of excellent workmanship and taste. To the maker is awarded a First Premium.

No. 1540, Pennsylvania hose carriage, and 1588, Kensington hose carriage, by Boyle and Jeffries, Philadelphia. Excellently constructed, in good taste, of strong and creditable workmanship and materials. The makers are entitled to a First Premium.

No. 1593, Reliance fire engine, by Joel Bates, Philadelphia. Strong, substantial, and well built for action. The maker deserves a First Premium.

No. 635, coach bolts, by E. & P. Coleman, Philadelphia. A fine and superior article, worthy of a Third Premium.

No. 698, coach bolts, by John Jones, are good, and creditable to the maker.

XXIII—*Leather and Morocco.*

No. 352, sole leather, by Francis Shriver, Westminster, Maryland.

This leather is said to have been tanned in four months, by Brown's patent process. It is solid and well tanned, and the judges regard it as the greatest improvement in the article of leather ever submitted to the public. It is considered worthy of a First Premium.

No. 312, sole leather, by C. B. Williams, Philadelphia. This is an excellent article, well tanned, and prepared with care. The judges consider it worthy of particular notice, though not better than that for which the maker received a premium last year.

No. 305, sole leather, by W. H. Crawford, is a very good article. Mr. Crawford also received a premium at the last exhibition.

No. 372, calf skins, by H. M. Crawford. One dozen of these skins deserve particular notice. The material, tanning, and currier's work are better than any French calf skins the judges have seen, though not much better than those previously exhibited by the same maker. They are solid, soft, and smooth, and do not rumple with handling as others. The committee award a First Premium.

Other specimens of sole leather and calf skins are creditable but of no particular excellence.

The patent and enamelled leather is considered as highly creditable; but no award is recommended by the judges. The specimens of morocco are very good; but not particularly remarkable for any extra qualities.

XXIV.—*Boots and Shoes.*

This department of the exhibition is creditable to the depositors, for quantity, quality, and variety, particularly in the branch of ladies' work.

No. 308, ladies' gaiter boots and shoes, by Wm. Ryan & Co., are considered by the judges as superior to any exhibited, for style, workmanship, durability, and neatness of finish. They merit the award of a First Premium.

No. 357, ladies' gaiter boots and shoes, by C. Fontaine. Fine specimens of the French style of work, and entitled to a Second Premium.

No. 379, ladies' winter shoes, by J. R. Douglas. These are worthy of notice as creditable specimens of his efforts to make them water proof.

No. 387, gentlemen's dress boots, by L. Benkert. This work is creditable to him as a mechanic: he received a first premium at a former exhibition for the same kind of work.

No. 335, gentlemen's dress boots, shoes, and slippers, by C. Corvaizier. Worthy of notice for workmanship, durability and taste.

No. 375, gentlemen's boots, shoes, and slippers, by H. Herth. The ornamental and fancy work on the tops of one pair is equal to any French boots imported. They are all worthy of notice for neatness.

No. 331, gentlemen's dress boots, by C. Benkert. Very creditable to the maker; but not better than those for which he formerly received a premium.

No. 338, shoemaker's tools, by C. H. Blittersdorff. For exquisite finish and adaptation to the intended uses, these articles deserve a First Premium.

XXV.—*Chemicals.*

In this, as in some other departments of the exhibition, owing to the delay of depositors in bringing in their specimens, the list of articles entered in time for the judges' list was unusually small, though the tables were afterwards profusely covered with articles of great beauty and merit.

Nos. 311, 313 & 323, starch, from the manufactories of Altemus, Colegate, and Kester & Walmsley. All the specimens are of handsome appearance, particularly that by Altemus; but it is not free from acid, which impairs its quality. An acid taste, though in a slighter degree, was manifest in the other specimens, though that of Kester and Walmsley presented it but faintly.

No. 336, chemicals, by Thos. S. Wiegand, of the U. S. naval hospital, N. Y. These are samples of the articles furnished to the U. S. vessels sailing from that port, and exhibit very praiseworthy care in the preparation. They deserve a Third Premium.

No. 353, iodide of lead, by S. M. Bines ;—a very beautiful preparation.

No. 332, tannic acid, by H. A. Guier ; a handsome specimen entitling the maker to great credit.

No. 371, prussiate of potash, by Smith and Worthington ;—a very beautifully crystalized specimen of this important article,—worthy of a Second Premium.

No. 378, pine oil, by B. T. Davis, Camden, N. J.—This bottle is stated by the maker to be the material ordinarily manufactured by him for use in lamps, which are now extensively used. As the article is of very considerable economical interest, and is extremely pure and carefully prepared, the judges recommend the award of a First Premium.

No. 351, black lead crucibles, from the Phœnix Manufacturing Co., Taunton, Mass., deposited by Cresson, Fisher & Co. One of them was submitted to trial by the melter and refiner in the U. S. mint, who reports it equal if not superior to the best German pots, having stood not only a high heat, but the action of the most corrosive fluxes, without apparent injury. The committee therefore award to the makers a First Premium.

No. —, acetate of lead, by Mordecai Lewis & Co. A beautiful specimen of crystalization, for which the judges recommend a Second Premium.

The committee regret that the articles deposited by Farr, Powers & Weightman, Wetherill & Brothers, and the black lead crucibles by Mr. Dyre, came too late to find a place on the list furnished to the judges.

XXVI.—*Philosophical Apparatus.*

The number of articles deposited under this head, in time for com-

petition, is not so great as in some former years; but many of them show a decided advance in workmanship and appearance.

Nos. 614 & 696, mechanical powers, and air pump, by L. C. Francis. Well made and creditable articles, to which we award a Second Premium.

Nos. 626, 618, 634 & 651, electro magnetic coils, by Bingham, Gumpert, Neff, and Stratton. All these instruments appear to answer their purpose equally well, and any preference by the judges relates only to the simplicity or compactness of the contact-breaker, &c. No. 626, by Bingham, has the contact-breaking magnet included in the main coil. We award to it a Third Premium. No. 618, by Gumpert, for the compact form of the secondary magnet and contact-breaker, is also worthy of a Third Premium.

No. 648, an improved compass and level, by Wm. J. Young: made with the accuracy and skill which always characterize Mr. Young's instruments: a Second Premium.

No. 714, set of standard weights and measures, scale beams, &c., by F. Meyer & Co. The judges notice, with pleasure, the continued improvement in neatness and workmanship shown by Messrs. Meyer & Co. at each successive display, and regard the present set of standards, if any thing, rather superior to those for which a first premium was awarded last year. For the accuracy of adjustment of a large druggists' balance, we now award them a Second Premium.

No. 720, a large balance for weighing gold,—made at the U. S. Mint, under the direction of Franklin Peale, Esq. This instrument has excited high and deserved admiration. The intrinsic perfection of its design and workmanship will add, if possible, to the reputation which the workshops of the Mint have already long possessed. The case is so contrived as to give perfect protection to all the working parts of the balance, while free access is at the same time allowed to the pans. To its constructor, Franklin Peale, Esq., is awarded a First Premium.

No. 625, a set of slides for magic lanterns, by Henry S. Nolen;—very well executed, and worthy of a Third Premium.

No. 628, galvanic bands, by Bucklin & Mills. The amount of electrical action, which these bands can produce, must be so trifling as, in the opinion of the judges, to render them inefficient for medical purposes.

Among the articles entered too late for competition, we notice a well made magneto-electrical machine by Francis; and a well designed and constructed apparatus, by Duffey, for illustrating the refraction of light.

XXVII.—*Straw Goods.*

This department is one that gives employment to a large number of persons, and the work is of a kind peculiarly adapted to the employment of females: hence, if proper attention and encouragement is given to it, it may be found of great value to the community.

No. 932, a bonnet, by Eliza Garrigues, knit of American cotton thread,—is a very good and durable article, neatly made, and formed

in proper style. For the skill shown by this lady, and the beauty of the article, we award a Second Premium.

No. 944, straw bonnets. China pearl, Coburg, and gimp, by Mrs. Buckman, of Lambertsville, New Jersey. Great perseverance and skill are shown in the manufacture of these articles, and they are a very fair imitation of imported goods of the same kind. They are worthy of a Second Premium.

No. 976, a rye straw bonnet, by Jane M. Atwood, of Salem, Washington county, New York. A very durable article, being well sewed and plaited,—and evinces much ingenuity and skill. We consider her deserving of a Second Premium.

No. 933, open straw and hair gimp trimmings, by D. B. Legg. These are of neat and beautiful workmanship,—and merit a Third Premium.

No. 936, straw bonnets, hats, and caps, by Mrs. Wythes. For their neatness, beauty of style, and good workmanship, we award a Third Premium.

XXVIII.—*Surgical Instruments.*

Among this class of articles the judges remark a number of cases of artificial teeth which in some respects are equal to those heretofore exhibited, and in others surpassing them.

No. 615, artificial teeth, by Dr. G. Plantou. These are deemed the best in the exhibition, because they most accurately imitate nature. The judges recommend to the maker a First Premium.

No. 652, dentist's plate-work of gold, by Dr. R. T. Reynolds. The judges consider this the best we have ever had in our exhibitions, and recommend a Second Premium.

No. 664, artificial teeth, by Wilkinson and Armstrong, are better than common, and merit a Third Premium.

No. 665, dental articulator, by Thomas Wardle, deserves a Third Premium.

No. 663, an artificial leg, by B. Franklin Palmer, of Meredith, Maine. This is considered by the judges as deserving of much commendation, being the best they have ever seen. This article has been referred to the Committee on Science and Arts for a further examination.

Among the articles entered too late is a dentist's chair, of a new and very simple construction, made by John Barr, and deposited by Dr. W. S. McIlhenny.

XXIX.—*Perfumery.*

But few articles in this line were deposited which merit any especial notice. The only award made is the following:

No. 389, a lot of fancy soaps, by Thomas Worsley, Philadelphia, which the committee think deserve a Third Premium.

Mr. Hinton also exhibits Cologne water of excellent quality, equal to that for which he received a Premium last year.

Shaving cream, by L. G. Bull, also appears to be good and is neatly put up.

XXX.—*Gum Elastic Goods.*

The judges on this branch report, that the goods deposited in time to be examined by them are less in quantity and variety, than at former exhibitions. They think that the articles deposited by Thornley, and also those by Ripley, are equal, but not superior, to specimens formerly exhibited by the same manufacturers.

XXXI.—*Copper, Brass, and Plumbers' Work.*

No. 601, an ornamental revolving fountain, by John Dutton, Delaware county, Pennsylvania. A very neat piece of workmanship; but the judges, not having seen it in operation, decline expressing an opinion with regard to its merits.

No. 1629, brass cocks, by Henry English, Philadelphia. The workmanship is very creditable, and the articles are well finished.

No. 1653, leather hose, by G. & W. Dialogue. The materials and workmanship are of the very best quality. The makers are of well known reputation, and have received favorable notice at former exhibitions. We now award them a Second Premium.

No. 1529, hemp hose, by Amasa Stone. A valuable article for purposes where warm liquids are used; for ordinary use by firemen, it is not so durable as leather.

XXXII.—*Tin Work.*

No. 1639, a lot of tin work, by Isaac S. Williams, Philadelphia. Of this work the judges speak in terms of high commendation; especially of the planished work, for which they recommend a first premium; but Mr. Williams being a member of the Board of Managers, our rules forbid any award to him.

No. 1658, revolving cans, for factory use, by H. W. Butterworth, Philadelphia. This is good and durable work, of the same kind for which the maker received a premium last year.

XXXIII.—*Paints and Colors.*

No. 361, Prussian blue, by Robert B. Potts, Philadelphia. This article is of excellent quality, and is regarded by the judges as superior to any in the market. They recommend for it the award of a First Premium.

Several specimens of white lead were exhibited, which the judges deem equal to any imported both in body and in color. On account of the very slight difference existing between these white leads, and other specimens in this and former exhibitions, the judges state that they feel a delicacy in making any award, fearing they may do injustice to some of the parties.

A number of very good articles in this department were brought in too late to come under the notice of the judges.

XXXIV.—*Fancy Articles.*

The amount of indifferent and uninteresting articles deposited under this head, is this year considerably less than usual; but we still find on the list many which it would have been as well for their de-

positors to have left at home. The following is extracted from the report of the judges.

No. 902, a case of fancy articles, by Mrs. Waterman, are tastefully executed, and merit the award of a Third Premium.

No. 905, fly brushes and fans, of peacock feathers, by Jacob Wilt. Handsome and ornamental; well made, in good taste. A Third Premium.

No. 922, fancy feathers and military plumes, by Mrs. Griffiths, late Freeman. These goods are equal in excellence to those for which the maker received a premium at the last exhibition.

No. 967, pearl work, by R. & A. Walter: Beautiful, and deserving of a Second Premium.

No. 927, military equipments, by Wm. Pinchin: Admirable specimens of workmanship in this line: the designs excellent, and the execution tasteful. They merit a Second Premium.

No. 971, face caps and flowers, by Miss J. Juel: Elegant and tasteful ornaments for ladies' head dress; deserving a Third Premium.

No. 904, glass hair dresses, by Joseph Weed, Kensington: Neatly made, in the ordinary style of glass weaving.

No. 968, morocco satchels, by Miss A. Williamson: A neatly made and serviceable article.

No. 924, fancy confectionery, by J. F. Sheek: Good things, handsomely ornamented, and very creditable specimens in this branch of art.

No. 1024, pickles, by T. B. Smith: Prepared in his usual excellent style, and similar to those for which he received a premium at a former exhibition.

No.—, fancy worsted work, by Mrs. Robinson: Admirably executed, and worthy of a premium had it been sent in time.

No. 1033, bead work, by L. E. Massey: too late; but worthy of notice for neat and excellent workmanship.

A number of other very good articles were brought too late to receive the requisite attention and notice.

XXXV.—*House-Keeping Articles.*

The articles in this department exceed in variety and number those at any former exhibition. They are in general well made, and properly adapted to the purposes intended. In our examination of them we have been kindly aided by a committee of ladies, whose report gives evidence of minute and careful attention, as well as sound and discreet judgment.

No. 1506, washing machine, by Ira Avery: recommended to a favorable notice on account of its compactness and portability. It is accompanied by a wringing machine, which appears to act very efficiently.

No. 1509, a shower bath, wash stand, and dressing table combined; made by L. Stebbins. This is an elegant, neat, and compact article, which we consider worthy of a Second Premium.

No. 1516, washing machine, by E. Lukens: highly recommended by those who have used it.

No. 1259, housekeeping articles, by Wm. Boyer; consisting of sieves, cucumber cutter, cabbage cutter, almond cutter, &c., &c., very neatly made and useful articles. The almond cutter is worthy of special notice.

No. 1533, cedar ware, by S. Tompkins: good and creditable work.

No. 1264, brooms, by Manly Rowe: well made articles.

No. 1557, basket work, by Robert Swift, deserves favorable notice. A small basket, made by John Lafferty, aged 12 years, of very neat workmanship, deserves a Third Premium.

No. 1573, churns, by E. Spain. A great improvement is observable in the dashers of these churns, by which the cream is agitated thoroughly in the centre, as well as at the circumference, thus expediting the process; and being so contrived as to be removed from the body of the churn, when necessary for cleaning. To the maker is awarded a Second Premium.

No. 1597, sliding top shower baths, by John R. Wheeler. Handsomely finished and useful articles.

No. 1598, a refrigerator, by James Smith. This article is lined with zinc, filled in with pulverised charcoal, and has movable shelves. For its neatness, compactness, and utility, it is worthy of favorable notice.

No. 1599, a cellar screen, by Owen Baldwin, is very neatly made.

No. 1600, washing machines, by Beck & Porter. These machines have an ironing table attached, which is a useful appendage.

No. 1615, refrigerators and filter, by Oliver Evans. Made in his usual good style, and very similar to those by him at former exhibitions.

No. 1648, bread knife, by E. W. Bushnell. This instrument performs its work admirably; cutting the bread, if required, into very thin slices, with great ease. We consider it worthy of a Third Premium.

Velocipedes, by the same maker, for little girls, are beautifully finished, and deserve favorable notice.

Several barrels of very good flour were exhibited, which was carefully examined, and bread made from the flour in each barrel was baked in the cooking stoves in the exhibition. The judges were unanimous in opinion that the flour from No. 1508, by David Leech, Leechburg, Penna., deposited by A. Wright & Nephew, is greatly superior to any other exhibited, both as regards whiteness and quality. We award to it a First Premium.

XXXVI. *Clothing and Needlework.*

Having last year been efficiently aided by ladies of taste and judgment in the examination of articles in this department, we have on the present occasion again solicited female assistance, which has been cheerfully and diligently rendered. From their neat and lucid report, we make the following awards and notices.

No. 911, a great variety of articles made by the pupils of the Pennsylvania Institution for the instruction of the blind. Many of these

specimens possess much merit, and would be creditable to seeing persons. The knitted polka, by Sarah Marsh, is equal in beauty and finish to any exhibited. For the whole display, and to encourage the pupils of that valuable institution, we award a

Second Premium.

No. 981, children's clothing, by Mrs. Edwards: Exceedingly beautiful in design, and of superior workmanship. Worthy of a

Second Premium.

No .938, Odd Fellows' Regalia, by J. W. & E. D. Stokes; and No. 997, the same, by L. Hyneman. All rich and elegant in design and execution. Those by Stokes are considered superior, and deserving of a

Second Premium.

No. 958, a fire screen, by Mrs. R. Rittenhouse, Germantown. A very beautiful specimen of needlework; perfect in design; colors well blended, and of admirable execution. It merits a

Second Premium.

Nos. 925, 926, specimens of embroidery, by Miss Gillespie. Beautiful examples of tufted needlework, for the general merit of which we award a

Second Premium.

No. 928, embroidery, by Eliza W. Pidgeon. A very elaborate piece of needlework, of excellent workmanship, though the colors on some parts are not properly blended. The needlework deserves a

Third Premium.

No. 1009, French plaiting, by Madame Juery: very beautifully executed. One of the judges witnessed the process, and testifies to its being entirely done with the fingers and with great rapidity. It merits a

Third premium.

No. 962, embroideries and caps, by S. A. Harrison. Creditable articles, taken from the stock on hand.

No. 1012, embroideries, &c., by Madame Fillot. Superior in workmanship and tasteful arrangement.

No. 921 & 945, woven coverlets, by Mrs. Myers and Mrs. Fretz. Of more tasteful pattern than those formerly exhibited.

No. 916, knitted bed spread, by Mary Alsop. This is a creditable article; but not equal to one of similar appearance, but without seam, by Miss Smith, which came too late for competition.

Concerning the bed quilts, the judges remark that they perceive no improvement in design or workmanship, over those exhibited last year.

Nos. 952, 977, 1000, shirts, stocks, and wrappers, from the establishments of Messrs. Walborn, Ward, and Lancaster. A number of these are of good workmanship and pattern; but none so far superior to those exhibited last year, as to be worthy of particular remark.

Several well made coats and other articles of gentlemen's clothing were brought too late for entry on the lists furnished to the judges.

It is a subject of regret that the display of plain needlework is not greater. Articles of ordinary wear as well deserve consideration as those intended for ornament; and it is hoped that, upon another occation, more attention will be paid to that branch of domestic industry.

Obituary notice of the late ISAIAH LUKENS. *(Read before the Franklin Institute, at its Monthly Meeting, November* 19, 1846.*)*

ISAIAH LUKENS, late Vice President of the Franklin Institute, departed this life on the twelfth of November, 1846, at his residence in Market street, Philadelphia. His death was occasioned by the rupture of an aneurism of the aorta, a disease to which he had been subject for several years, and of the probably fatal termination of which he appears to have been for some time fully sensible.

He was descended from one of the most ancient families of settlers in Pennsylvania; his ancestors having come to this country from Holland or Lower Germany in 1698, about the time of the second and last visit of William Penn to his colony. His progenitor, Abraham Lukens, settled as a farmer at or near Germantown, about the time of the first laying out of that village.

The Lukens family afterwards extended by its various branches into Montgomery county, where they were generally remarkable for their skill and ingenuity. John Lukens, who was for some time Surveyor General of Pennsylvania, was a member of this family, and was noted for his ability as a surveyor and mathematician.

Seneca Lukens, the father of our deceased friend, resided on his farm at Horsham, in Montgomery county, where he also carried on the business of a clock and watch maker; and his son having a strong taste for mechanical pursuits, soon became skilled in this business under the instruction of his father.

Isaiah Lukens was born in August, 1779, and having received such education as was then afforded by country schools, he established himself, on coming of age, in the business of his father as a clock and watchmaker. But his country situation did not afford a sufficient opportunity for the full development of his mechanical genius and his extended views; and about the year 1811 he removed to Philadelphia, where his peculiar genius and fondness for scientific investigation soon brought him into connexion with those of similar pursuits, at a period when such subjects were attracting much attention, and science was rapidly advancing, both from discoveries in Europe and the increasing taste manifested for it in this country. He soon took an active part in the promotion of useful knowledge, not only as a practical mechanician, but with a fair understanding of the principles both of mechanics and natural philosophy, which form the basis of the mechanic arts.

In the year 1813, a belief in the delusive principle of *perpetual motion* was created throughout a considerable portion of the community by a deceptive machine constructed by Redhoeffer, and had gained sufficient character to induce an inquiry into its reality by the appointment of a committee from the Legislature of Pennsylvania. The attention of Mr. Lukens was turned to this subject, and although the actual moving cause was not discovered, yet the deception was so ingeniously imitated in a machine of similar appearance made by him, and moved by a spring so well concealed, that the deceiver was him-

self deceived, and Redhoeffer was induced to believe that Mr. Lukens had been successful in obtaining a moving power in some way in which he himself had failed, when he had produced a machine so plausible in appearance as to deceive the public.

After having successfully conducted his business in Philadelphia for several years, his attention was called to the new invention of Professor Civiale, of Paris, for the operation of Lithontripty, to which instrument Mr. Lukens undertook to add several important improvements. A desire to introduce these with the use of the instrument, induced him to visit Europe; but there his improvements, though of acknowledged merit, do not appear to have obtained due consideration or the requisite fair experiment, partly, perhaps, on account of the jealousy naturally felt at the interference of a foreigner not gifted with a medical title. To this cause did he attribute his being prevented from obtaining the just reward of his skill and ingenuity in the improvement of this instrument.

Disappointed in the object of his voyage to Europe, and in the expected emolument to be obtained for his improvements, he resorted for support to his business as a clock and watch maker. Availing himself of his superior knowledge in making springs for chronometers, and his ability to make surgical instruments of an improved kind by a better method of tempering steel, he in this way obtained funds for his maintenance during a stay of three years in England and France.

After his return to Philadelphia, in 1828, he was employed in making clocks for public buildings and institutions in this city and distant places. Among his works of this kind may be mentioned the clock in the State House at Philadelphia, those made for the Bank of the United States, the Philadelphia Bank, and others, which remain as monuments of his skill in introducing improvements, as well as of the accuracy and fidelity of his workmanship,—and which may challenge competition with similar articles in any part of Europe.

The requisite observations for keeping the city time in Philadelphia were committed to him, and these were obtained from his own transit instruments. Such observations are important, not only for the mere adjustment of the public clocks; but as a means of obtaining the true time for the regulation of marine chronometers, so indispensable for the purposes of navigation, and affording the readiest means of computing the longitude at sea.

The acquirements of Mr. Lukens were not confined merely to mechanical science; nor was his attention exclusively directed to subjects connected only with that particular branch of knowledge. He possessed a taste for the study of mineralogy and other departments of natural science, in which his attainments were creditable to himself and useful to others. He felt a lively interest in the progress of useful improvements, and from his general knowledge and habits of close investigation, was well qualified to judge of their merits,—encouraging such as were deserving, by his approval and influence.

On the establishment of the Franklin Institute for the promotion of the mechanic arts, he was one of its earliest members and supporters; and was chosen as Vice President, at the first election held by the

society, on the sixteenth of February, 1824. As a member and officer of the Institute, from that time until the period of his death, he was eminently useful; freely yielding his time and attention to the various duties which he was required to perform,—and by his advice and assistance aiding and supporting the Institute in its various operations for the benefit of science and the useful arts. His punctuality, diligence, and intelligent service on committees appointed for the investigation of many important subjects, will be long remembered among us; while the kindness of his disposition, and the many amiable and excellent qualities of his heart and his mind, endeared him, in an eminent degree, to those who enjoyed opportunities of familiar intercourse with him.

The Franklin Institute considers this notice and memorial of its deceased Vice President as justly due on the present occasion; not only from his position as one of its chief officers,—but also on account of his general services to the society on all such occasions as called for the exercise of his knowledge and abilities in its behalf,—as well as for the readiness of his disposition to promote objects of utility and the interests and purposes of the Institute.

Mr. Lukens was also a member of the American Philosophical Society, and of the Academy of Natural Science,—and these societies, in common with our own, have suffered by his death a loss which will be deeply felt and sincerely lamented.

MECHANICS, PHYSICS, AND CHEMISTRY.

The Gun-Cotton.

We insert the following notices of the new discovery of Explosive Cotton, which is now attracting much attention. Several chemists in Philadelphia have succeeded fully in manufacturing the article; and, at the meeting of the Franklin Institute, held November 19th, 1846, Dr. James B. Rogers, Professor of Chemistry in the Institute, exhibited a number of specimens manufactured by him, which were highly explosive and adapted for use in fire-arms. Dr. Paul B. Goddard exhibited drawings of filaments of cotton as seen by means of a microscope of high magnifying power, and explained how the gun-cotton may be readily distinguished from common cotton by this means.

COM. PUB.

From the Washington Union.

Extract from a letter received in this city, dated

"BREMEN, Oct. 12, 1846.

"The secret has been discovered by a celebrated chemist, Professor Otto, of Brunswick, and by him promulgated to the world. I hasten to furnish you with translations of two publications which he has just made concerning it.

"The gun-cotton can be prepared, under the accompanying directions, by any apothecary who understands his avocation properly. Many experiments have been made with it in this city, and the result uniformly has been such as to establish general confidence in its vast superiority over gunpowder—an estimation which, from the first, I believed it would attain."

[Translation.]

From the Hanover Gazette.

BRUNSWICK, Oct. 5, 1846.

Totally independent of Schönbein and Böttger, relying on an observation of Pelouze, which is contained in my compendium of chemistry, first volume, page 136, I have succeeded in preparing *exploding* cotton, which, after experiments made with it, seems to be an excellent substitute for gunpowder. In order that the results of important discoveries may be brought to the highest degree of perfection, without unnecessary delay, it appears to me to be proper to give publicity to them immediately, in order that other scientific persons may occupy themselves in making improvements upon such inventions. I therefore disdain to sell or ask a patent for the highly valuable one which has been made by myself, the vast consequences of which cannot yet be calculated, and I herewith give publicity to it for the general use of the public.

For making exploding cotton the common well-cleaned staple must be dipped in highly concentrated *acid* of saltpetre, (the *acid* which I use is made by distilling ten parts dried saltpetre, and six parts oil of vitriol or sulphuric acid,) then it is put into fresh water, which is often changed, and care must be taken to loosen thoroughly the cotton, which, from the process, becomes matted; after which, it must be well dried. Thus the exploding article is in a state of preparation for the gun-barrel.

The effects of this article astonish every body who witnesses them. The smallest quantity explodes with the quickness of fulminating quicksilver powder, if struck with a hammer on an anvil. If put into a gun, a smaller quantity in weight will do as much execution as gunpowder. It is used precisely in the same manner as gunpowder—a piece of paper being necessary between the ball or shot, as in ordinary firing. The ignition is always certain from the explosion of a percussion cap. All persons, without exception, who have been present at the exhibitions I have made of its properties, were fully convinced of its practicability. The testimony which I annex of two distinguished persons, who have made arms their profession, will corroborate my statements:

"Yesterday, the 4th of October, we were present at the first experiments which were made with the exploding cotton, in the laboratory in this city, and to-day we have convinced ourselves of the perfectly satisfactory results, with sharp loaded fire-arms.

HARTEG,
Doctor, counsellor of Forest Board.
A. VON SCHWARZKOPPEN,
High Forester."

Extracts from the second report of Professor Otto, assessor of the medical board, chemist, &c, &c., &c.

"It seems that no other acid than that produced by the distillation of ten parts of saltpetre, and six parts of oil of vitriol, will confer upon raw cotton its explosive power. Hydrate of nitric acid *(salpetersäürehydrat)* dissolves the cotton. In good proper acid, the cotton becomes transparent, and the fibre is not injured or dissolved. The aid by distillation first produced is best. Cotton dipped into it for half a minute, and then quickly pressed between glass plates, or boards, and washed afterwards until it is entirely free from acid, and subsequently dried, produces a superior exploding article. Using the acid a second time, an inferior article is made; but if after having been washed and dried it is again dipped into the acid it becomes excellent. A repetition of the manipulation necessarily augments the exploding quality. Cotton may even remain in the acid longer than half a minute. That which has laid in it as long as twelve hours was found to be very explosive. It is important that the cotton be well washed when it is taken out of the acid; for if any remains in it, a saltpetre flavor will attach to it when dry, and when exploding will leave on anything white an acid tincture. The vivid explosion of a small ball of the article, on a white china plate, is the criterion to test its good quality by. It must flash like gunpowder, and leave no dust behind it. If a particle even is seen it cannot be used in guns. It also appears to be necessary that the cotton, after having been dipped into the acid and pressed, be immediately put into a large quantity of water. If the cotton be put into an insufficient quantity of water, it (the cotton) gets heated; and small quantities of cotton are also preferable; for, if large, it forms into knots of a bluish-green color, which are so firm, as not to be easily loosened. The more the *prepared* article resembles the one in its *natural* state, the better and more powerful it is. With $\frac{5}{4}$ ths or $\frac{6}{4}$ ths of a *gran*—480 *grans* equal to an English ounce—balls of $\frac{1}{2}$ inch diameter were driven through boards one inch thick. With 6 *grans*, a bullet was driven from a rifle, at a distance of 45 steps, into an oak plank, to the depth of an inch; and, with four or five grans, effectual shots have been made with fowling-pieces. The more readily the cotton explodes, the greater the care to be taken in handling it."

Professor Schönbein, at an experiment made in presence of one of the editors of the Times, tested some gun-cotton which had been immersed in water *sixty days*, and found it as good as when perfectly fresh, after having been dried.

To the Editor of the Union:

ORDNANCE OFFICE.

Washington, Nov. 13, 1846.

Enclosed is a copy of Capt. Mordecai's official report of the comparative forces of "gun-cotton" and gunpowder, so far as the small

quantity of the former would admit of a trial.

I am, dear sir, yours, &c.,

G. TALCOTT,
Lieut. Col. Ordnance.

WASHINGTON ARSENAL,
Nov. 13, 1846.

SIR:—The following tabular statement shows the results of the comparative trials made yesterday, at this arsenal, with rifle powder, and a sample of the *gun-cotton* prepared by Professor Schönbein and brought to this country by Mr Robertson.

Experiments with the musket pendulum.

Kind of powder.	Charge.	Height of charge in the musket.	Initial velocity of the ball.	Remarks.
Duponts rifle powder	Grs. 120	Inches. 1.8	Feet. 1,531	Mean of three rounds.
	60	1.25	1,062	Ditto.
Gun cotton.	30	1.6	971	Charge rammed slightly, after the ball was inserted; some of the cotton was expelled unburnt.
	60	1.8	1,426	
	60	2.5	1,567	
	50	2.6	1,489	

The quantity of cotton offered for trial was too small to admit of a repetition of the experiments. The above results are, therefore, to be regarded as only approximative. To give a fair indication of the force of this new explosive substance, it would be necessary to make experiments as to the best mode of using it in the gun, especially with regard to the proper degree of compression by ramming. A comparison of the results of the two charges of 60 grains shows, as might be anticipated, a marked variation produced by different degrees of compression. The ball and wad occupying, in every case, a height of about ¾ inch, the space occupied by the cotton or the gunpowder may be deduced from the height of the charge given in the table.

From these trials the gun-cotton seems to produce, in the musket, an effect equal to about twice its weight of good rifle powder. This cotton leaves a small quantity of a dark-colored residuum in the musket barrel, extending from the breech to about half the length of the barrel; this residuum is easily removed by wiping the barrel with a rag. The combustion of the gun-cotton is unattended with smoke; the report made by it appeared to me sharper than that produced by gunpowder.

It may be proper to add that Mr. Robertson does not consider this sample of the gun-cotton to be of the best quality.

Respectfully, your obedient servant,

A. MORDECAI,
Captain of Ordnance.

Lieut. Col. GEO. TALCOTT,
Ordnance Department.

Painting on Glass.

A paragraph now and then makes the round of the newspapers to the effect that such a one, in Belgium or elsewhere, has discovered some ancient receipt, containing the whole secret of "the long lost art" of Painting on Glass. Now the fact is, that this secret has been in print (and, I believe, easibly accessible) for years:—the only singularity is that, though the receipts are given at full length, artists have failed to recognize what was under their very eyes. These seem to have persisted in prosecuting their researches in a wrong direction,—misled, probably, by the term *Painting on Glass*: which has occasioned them to suppose that the splendid red of the ancient windows (the only color which they could not imitate) was produced by the old artists by methods analogous to *painting* in enamel. The fact is, however, that the old artists had nothing whatever to do with producing this color: it was provided for them, ready made, at the glass-house,—in panes, sometimes solid, but generally superficially coated, or flashed, as it is called. When, towards the end of the last century, artists began to revive the art of glass-painting, they found little difficulty, save in this one color,—the splendid red,—which gives such brilliancy to the old windows. Here lay the secret which they were unable to recover: nor were the glass makers able to assist them—the art having become extinct among them also.* Within the last thirty years, however, the glassmakers have tried the old printed receipts; and have met with such success, that I suppose nothing but a sufficient demand is wanted to ensure the production of red glass in every way equal to the ancient. It is commonly on sale now, both at home and abroad. The whole secret of the "lost art" consists in this:— that, though the *deutoxide* of copper, when melted with glass, gives a green or sky-blue color, the *protoxide* gives the red in question; which by reflected light is dingy, but by transmitted light beautifully splendid. The difficulty is, that it requires much skill and practice on the part of the workman to prevent the copper, while the glass is in fusion, from taking up the additional dose of oxygen, and thus passing from red to green. There is another part of the secret, which is not a little curious:—that glass, though containing the proper oxide of copper when first taken out of the pot, often shows only a dirty greenish hue; yet nothing more is needed for throwing out the fine red tint than to expose the blown glass for a few minutes to a dull red heat.

I will mention a few books where the methods may be found. There is the 'Art de la Verrerie' of Neri Merret and Kunckel, &c.—Paris, 1752. The Paris Academy, about the same time, published Leviel's; 'Art de la Peinture sur Verre;' but it is remarkable that, at that period, Leviel was ignorant of any transparent red whatever,—which he much laments,—and was quite mistaken as to the ancient method. Muratori gives some very ancient receipts for 'Tinctio vit-

* Modern artists, I may observe, have discovered a substitute red, which seems to have been unknown to the ancients,— viz., the red from silver; which, though sometimes fine, can seldom bear comparison with the old red.

ri prasini,'—which I think he attributes to the age of Charlemagne. One has some difficulty in recognizing copper under the name of "*heramen.*" Baptista Porta writes as follows, about two hundred years ago,—showing that the method was then in some measure lost:—"Peritiores recentiores vitrarii in colorando smalto rosei clari coloris (vulgus rosachiero vocat), non parum insudant—videntes majores nostros—quod illud satis artificiose et pulcherrime confinxerint; nos et quæ ipsi fecimus et ab amicis habuimus recensebimus. Quod potuimus præstitimus aliis ansam præbendo meliora conficiendi. Hic erit modus rosacierum conficiendi." He then goes on to give his own method—see the edition in the British Museum, p. 257, cap. IX.

It may be worth mentioning, that French scientific men were so ignorant of the real method, that they obtained, during the Revolution, a large quantity of the red glass from the churches, for the purpose of analysis, at Paris in the expectation of finding gold. Of course, they found only copper and some iron.

"Mr. Cooper analysed some pieces of ancient red glass, and found copper, iron, and silver:—hence he concluded silver to be essential. This, however, is not the case; and the silver which he found was either accidental,—or, more probably, he had got among his pieces some of the modern, as well as the ancient, red glass."—*Annals of Philosophy*, Feb. 1824. Athenæum.

On an Improvement in the Daguerreotype Process by the application of some new compounds of Bromine, Chlorine, and Iodine, with Lime. By R. J. Bingham, *Chemical Assistant in the Laboratory of the London Institution.*

All persons who have practiced the Daguerreotype must have remarked, that in warm weather a considerable deposition of moisture takes place upon the glass or slate cover used to confine the vapor in the bromine or accelerating pan. This moisture must also necessarily condense upon the cold metallic surface of the plate during the time it is exposed to the bromine vapor. In fact, I have been informed by a number of professional Daguerreotypists (and I have experienced the difficulty myself), that they were unable to obtain perfect pictures during the excessive heat of the late season; and a very clever and enterprising operator, who last year made a tour on the continent, and brought home some of the finest proofs I have ever seen, entirely failed this season in obtaining clear and perfect pictures, from the constant appearance of a mist or cloud over the prepared surface. This appears to be caused by the deposition of moisture upon the plate, arising from the water in which the bromine is dissolved. To obviate this some have recommended the pan to be kept at a low temperature in a freezing mixture; and M. Daguerre, in a communication to the French Academy of Sciences, recommends the plate to be heated; but in practice both these plans are found to be unsuccessful. (See Lerebour's *Traité de Photographie.*)

It appeared to me, that if we could avoid the use of water altogether in the accelerating mixture, not only would the difficulty I have mentioned be avoided, but a much more sensitive surface would be obtained on the plate. With this view I endeavored to combine bromine with lime, so as to form a compound analogous to bleaching powder. In this I was successful, and find that bromine, chloride of iodine, and iodine, may be united with lime, forming compounds having properties similar to the *so-called* chloride of lime.

The bromide of lime* may be produced by allowing bromine vapor to act upon hydrate of lime for some hours: the most convenient method of doing this is to place some of the hydrate at the bottom of a flask, and then put some bromine into a glass capsule supported a little above the lime. As heat is developed during the combination, it is better to place the lower part of the flask in water at the temperature of about 50° F.: the lime gradually assumes a beautiful scarlet color, and acquires an appearance very similar to that of the red iodide of mercury. The chloro-iodide of lime may be formed in the same manner: it has a deep brown color. Both these compounds, when the vapor arising from them is not too intense, have an odor analogous to that of bleaching powder, and quite distinguishable from chlorine, bromine, or iodine alone.

Those Daguerreotypists who use chlorine in combination with bromine, as in Wolcott's American mixture, or M. Guérin's Hungarian solution, which is a compound of bromine, chlorine, and iodine, may obtain similar substances in the solid state, which may be used with great advantage. By passing chlorine over bromine, and condensing the vapors into a liquid, and then allowing the vapor of this to act upon lime, a solid may be obtained having all the properties of the American accelerator; or by combining the chloro-iodide of lime with a little of the bromine, a mixture similar to that of M. Guérin's may be produced: but I greatly prefer, and would recommend the pure bromide of lime, it being, as I believe, the quickest accelerating substance at present known. By slightly coloring the plate with the chloro-iodide, and then exposing it for a proper time over the bromide, proofs may be obtained in a fraction of a second, even late in the afternoon. A yellow color should be given by the use of the first substance; and the proper time over the bromide is readily obtained by one or two trials. With about a drachm of the substance in a shallow pan, I give the plate ten seconds the whole of the first day of using the preparation, and add about three seconds for every succeeding one. The compound should be evenly strewed over the bottom of the pan, and will last with care for about a fortnight.

The great advantage of this compound is, that it may be used continuously for a fortnight without renewal; and, unlike bromine water, its action is unaffected by the ordinary changes of temperature.

* I call this substance bromide of lime, although there is a difficulty as to the composition of bleaching powder, and which would also apply to the compounds I describe. Some chemists regard the *chloride of lime* to be a compound of lime, water, and chlorine. Balard thinks it is a mixture of hypochlorite of lime and chloride of calcium; and the view of Millon and Prof. Graham is, that it is a protoxide of lime, in which 1 equivalent of oxygen is replaced by 1 of chlorine.

I have hastened to communicate this during the present fine weather, believing that it will be acceptable to all interested in this beautiful application of science.

September 14, 1846. Lon. Ed. & Dub. Phil. Mag.

Iron Furnaces.

The best constructed furnaces in South Wales, are those at the Abersychan Iron Works; in Staffordshire, those built by Mr. Gibbon, at Corbyn's Hall, claims pre-eminence; and in Scotland, the furnaces at Dundyvan may be considered the most complete. Mr. Gibbon's furnaces are of the best construction at present adopted; but even these are far from having attained the limit to which an improvement in construction might be carried. By a different mode of construction, the furnaces at present in blast in the United Kingdom would readily afford an increased yield and superior quality of iron, amounting to 50 per cent. upon the quantity at present manufactured. The greatest yield of pig-iron, when the size of the furnace is taken into consideration, has been obtained at the Parkend furnace, where 140 tons of forge pigs have, I believe, been produced from a furnace containing 3400 cubic feet of materials in a single week. This great result is, however, solely to be attributed to the surpassing richness and fusibility of the iron ore, peculiar to the Forest of Dean, in which this furnace is situated. The best constructed forge and mill is the new one at Cyfarthfa, belonging to Mesrss. Crawshay. The best form of constructing hot blast pipes is, I believe, my own—viz.: a spiral tube of cast-iron; each thread of revolution of which is composed of two very flat elliptical segments of piping, 15 to 20 inches inside measure in width, by 3 to 4 inches in depth. The spiral tube thus formed, by jointing together these segments, to consist of as many revolutions as may be deemed sufficient; the more in number, of course, the greater will be the heating surface, and the less will be the amount of fuel required to heat the air. The complete tube to be enclosed by a cylinder of brick-work, heated like a common flue; the cold air to enter at the upper and cooler extremity of the tube, and, after descending along the heated spiral, to make its exit at the lower extremity, where the heat will be at a maximum. Hot-blast pipes thus constructed, and protected by brick-work, will last for an indefinite length of time; they will, likewise, admit of a maximum amount of heating surface, and facility of heating the air—whilst a minimum amount of fuel will be required to heat that air. Less friction will, likewise, be found to take place with such pipes than occurs in pipes constructed by the ordinary methods; whilst a temperature of a 1000° may be given to the air, with less danger to the safety and endurance of the pipes, than is at present incurred by them in obtaining a temperature of 500° to 600°. There is, however, no necessity for employing so expensive a material as cast-iron in the construction of hot-blast stoves: and I have long contemplated the adoption of a species of cement, which I have tested, to form an imperishable tub-

ing, capable of withstanding a heat which would speedily melt cast-iron pipes.—Mr. R. MUSHET. Min. Jour.

Report made by M. Dumas, of the Committee of Chemical Arts at Paris, on a work of M. J. Persoz, entitled, "A Theoretical and Practical Treatise on the Printing of Tissues."

The Society of Encouragement had offered a prize for the best treatise on the bleaching of tissues, and the manufacture of printed stuffs. Several years ago the sittings of the Society were discontinued, and the papers which had been received were deliberated upon, but none of these papers having been deemed worthy of the prize, the Society struck off this subject from their list.

However, one of our most skilful chemists, who was fortunately enabled to undertake and accomplish this difficult task, had devoted himself to it from the time that the Society's proposal was first made known; and although he was far from being satisfied with his work, when it was determined to withdraw the prize for this subject from the Society's programme, he thought it a duty he owed to the Society to persevere in the task which it had opened for him.

M. Persoz, Professor of Sciences, of Strasbourg, has now laid before you the result of his long and arduous researches, which he has combined in four beautiful volumes, accompanied by a specimen book of the most elaborate execution.

M. Persoz was born amongst the manufactures of printed calicoes; he passed the whole of his life in this occupation, and being fortunately situated in Alsace, in the very centre of our manufactories of printed calicoes, for the purpose of giving instruction in chemistry, every assistance was thus afforded him.

His work embraces every detail of this branch of industry; and his personal opinion is given, even in the midst of the most accurately collected information, and wisely discussed opinions; for such is the right of every author who has practised everything by himself, and who relies upon his own experience in all things.

Two volumes are devoted to the subject of coloring matter, the theory of dyeing, and the various processes of printing in colors, and also the nature and effect of the various machines used in this branch of industry.

Two other volumes contain an accurate description of all the processes of printing which are practised upon cotton and other stuffs of a similar description.

To each receipt is added a sample of the stuff, which gives the reader a faithful representation of the effect produced by the ingredients.

These samples, several hundred in number, exhibit the state of the art in all countries; for Alsace, Switzerland, Normandy, the environs of Paris, and England, and Scotland, have vied in liberality towards the author. He has received from the principal manufactures pieces of the stuffs, which, being cut into samples, are invaluable models to the reader.

By simple, new, and rapid processes, the author enables each manufacturer to define, himself, with great accuracy, the exact nature of the processes used for producing any color on a given fabric. This system of assay, from its precision and importance, does honor to the intelligence of M. Persoz, and will render the greatest services to the trade.

The Society has deemed it right to award to the author of this remarkable work a recompense in accordance with the services which it is calculated to render, and has therefore voted him a medal of the value of 3000 francs.

Desirous, however, of giving to the author and editor, whose zeal for the publication of this elaborate work is worthy of all praise, a further testimony of its great satisfaction, the Society has decided in adopting this treatise as the head of the collection of which they propose to favor the publication. In consequence of which the editor is authorized to place at the head of his work, a general title, bearing the following words:—"Library of the Manufacturing Arts, published under the auspices of the Society of Encouragement of National Industry and Chemical Arts."

Lastly.—The Society has decided on awarding this work as a prize to the various foremen in the manufactories of printed calicoes or other fabrics, who shall have merited this distinction.

Lond. Journ. of Arts and Sci.

Opening of the Enlarged Schuylkill Navigation.

This great work, which was begun last year, is now open for use. The first of the large coal barges, "the General Taylor," reached Philadelphia from the coal region on Saturday, November 21st. The improvement consists in increasing the capacity of the navigation to three fold what it was before, and in diminishing the number of locks more than one third. The new locks are 110 feet long and 18 feet wide in the chamber, being the size of those of the enlarged Erie canal of New York. When the deepening of some of the channels is completed, barges, carrying two hundred tons of anthracite coal, will be able to pass from Pottsville, via Philadelphia, to New York, without transhipment; which will be of vast advantage to the coal trade of Pennsylvania. R.

Deepest Artesian Well in Europe.

In the Duchy of Luxembourg, a well is being sunk, the depth of which surpasses all others of the kind. Its present depth is 2336 feet, nearly 984 feet more than that of la Grenelle, near Paris. It is said, that this immense work has been undertaken for working a large stratum of rock salt.

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